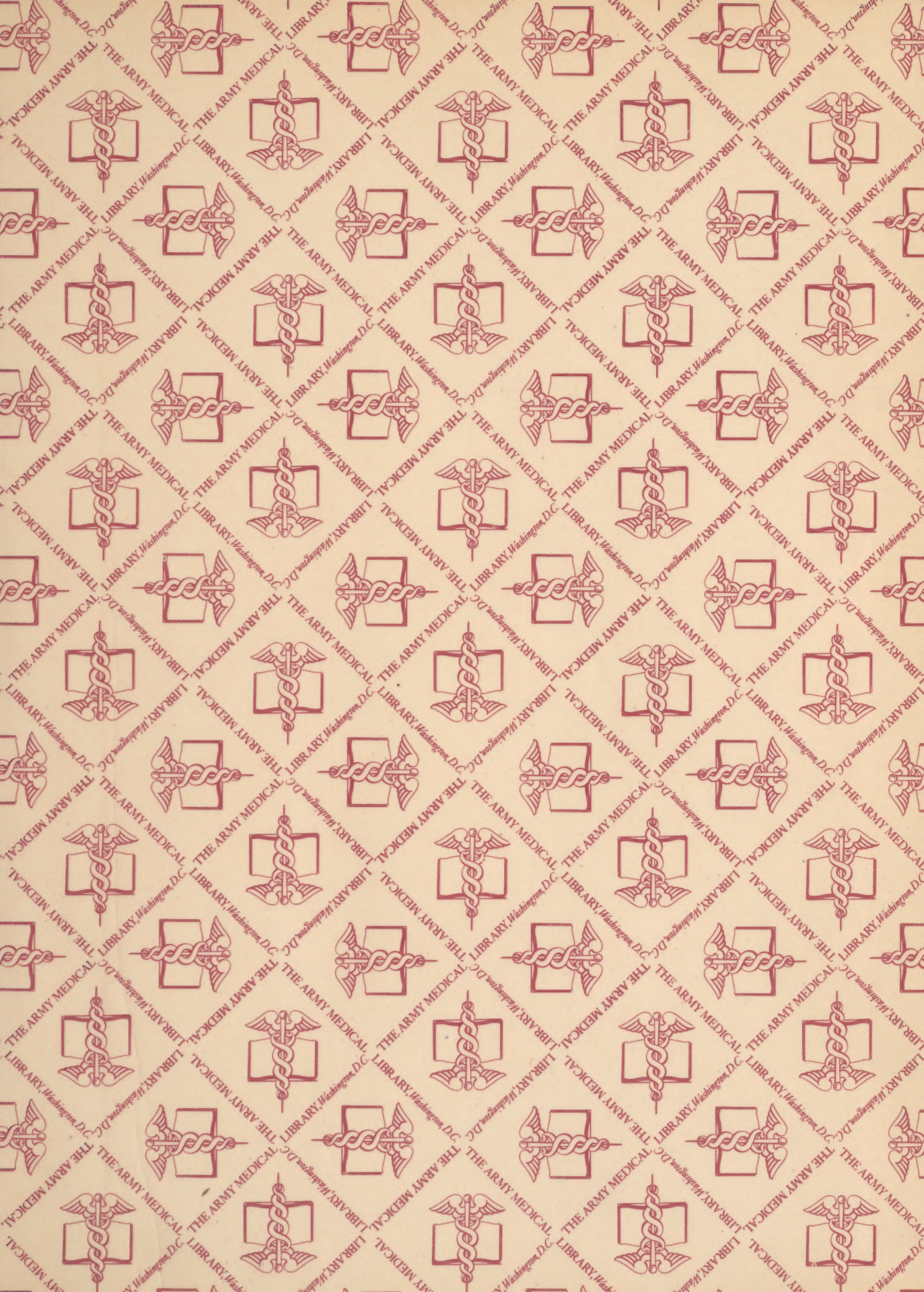

THE ARMY MEDICAL LIBRARY, Washington, D.C.

HYGIENE AND SANITATION

COMPILED AND
PUBLISHED AT

ENLISTED TECHNICIANS SCHOOL
LETTERMAN GENERAL HOSPITAL

FOR USE OF STUDENTS

PUBLISHED SEPTEMBER 1941
REVISED & REPUBLISHED AUG. 1942
REPUBLISHED MARCH 1943
REPUBLISHED JULY 1943
REPUBLISHED MARCH 1944

U.S. Army

SPECIAL SERVICE SCHOOL
LETTERMAN GENERAL HOSPITAL
MEDICAL SECTION

HYGIENE AND SANITATION
FOR
MEDICAL TECHNICIANS

REVISED
AND
COMPLETELY REWRITTEN
AUGUST 1942
REPRODUCED
FEBRUARY 1944

PREFACE

Hygiene and Sanitation. What is it all about? Why study? You say, "What good is it to me?" The answer is: your health.

Over a long period of time man has learned a good many things about sickness. If he does certain things, he might get sick. To study hygiene is to study a way of living -- a way to stay healthy. Such a study is based on those facts that have proven themselves of undoubted value.

But, a knowledge of facts is of no value unless we make use of them in a practical way. Military Sanitation is the study of how the facts of hygiene can be applied to our every day living, especially living in the field.

TABLE OF CONTENTS

PART I

PART II

THE SOURCES OF INFECTION AND THEIR CONTROL

PART III

TRANSMITTING AGENTS - DETAIL AND APPLICATION

PART IV

SUSCEPTIBLES: THEIR PROTECTION

GLOSSARY

PART I

Chapter 1

PESTILENCES

It is sometimes said that the men of long ago had no troubles. I suppose it is a comfort for us to believe that this was the case. From the point of view of sickness alone, however, our ancestors had pretty difficult realities to face. They feared Pestilence, Famine and Wars. Interestingly enough war was the least of their worries. The reason was perfectly simple. Pestilence at times caused the death of millions of people; whereas war resulted in the death of mere hundreds of men.

But what is pestilence? It is serious sickness. It spreads often from one end of a continent to another. At first not many people are sick. In time more and more become ill, perhaps one out of every two people. Thousands, hundreds of thousands, even millions may die. A pestilence is thought to be at its worst, when in the brief space of a day or two healthy people are suddenly struck dead.

Today we use such words as epidemics and pandemics in place of the word pestilences.

Epidemics are as old as man himself. It is to our advantage to mention some of the great epidemics of the past.

What is plague? Many of you, I suppose, have some vague ideas and no particular knowledge about this disease. Few realize that Greece suffered terribly from plague in the time of Pericles, 430 B.C. Thousands upon thousands died. Confusion, fear, and panic developed. Even the war against Sparta was temporarily halted.

During Caesar's lifetime, plague came to Rome. At first only a few citizens fell sick. Later, each new day came to be

dreaded, as the number of sick and dying ever increased. When the pestilence reached its greatest intensity, 10,000 people were dying every day. And Rome's population was only a little over a million people at this time.

Smaller epidemics continued to appear and disappear. In 542 A.D. Egypt was visited by a severe epidemic. At the height of the pestilence, there were 10,000 deaths a day in the city of Constantinople.

Then the plague once more developed into epidemic proportions in Italy. In 565, as a result of widespread deaths, panic, disorganization, and terror men became passive - so passive, in fact, that they became the easy prey of the invading Lombard troops from the North.

Without a doubt the years 1342-1349 were some of the blackest that man has ever endured. By 1341 plague was occurring at various places in Europe. By the next year epidemic proportions were reached, and by 1348 plague was striking terror and death into the peoples of Europe, Egypt, North Africa, and England. Of every 10 people who became ill, 9 died. "In their terror and ignorance, men did the very things which increased death rates and aggravated calamity. They fled from towns and villages, but death traveled along with them. Panic bred social and moral disorganization; farms were abandoned, and there was shortage of food; famine led to displacement of populations. Of the hundred million people, 25 million died as a result of the dreaded plague - the Black Death as it was called."

During the 15th Century there were at least six epidemics in Europe. In the 16th Century there were ten. By the middle of the 17th Century there had already been eleven. Then plague descended

upon England. In London the disease caused some forty deaths in May and each month witnessed more and more fatalities.

May.....	43	deaths
June.....	590	"
July.....	6,137	"
August.....	17,036	"
September.....	31,159	"

Each month, the number of deaths increased up to the peak, which was reached in September. This rapid increase is one of the characteristic features of epidemics. As a result of this particular epidemic, some 60,000 deaths occurred in London alone. This amounted to about one fourth of the population.

By 1769 the disease was spreading over the continent of Europe, as it had done so frequently in the past. In 1770 one fourth of the population of Moscow died (50,000). In the Ukraine there were 300,000 deaths.

Between 1896 and 1936 there have been 40 million plague deaths in India. Since 1936, man has gained considerable control over the once dreaded disease. In the last few years in India, there have been less than 30,000 people to suffer sickness from plague. Deaths have been much fewer. The Control, man has obtained, has been a great achievement.

Another disease that has cuased epidemics in the past is smallpox. In 1520, three and a half million died in Mexico, and Central America.

Cholera is another disease that has caused much misery and death in the past. It is interesting to trace the path, which cholera followed in the 19th Century. An epidemic occurred in India in 1817. Travelers and traders carried the disease to Japan, where an epidemic appear in 1823. From Japan to Russia cholera was carried

by those sick who traveled. Russia's epidemic came in 1830. Cholera spread toward Europe , which suffered from this pestilence from 1831 to 1832. An Irish ship carrying choleric passenger from Europe brought the disease to Canada in 1832. There was an epidemic in Europe in 1846, and another one in the United States in 1849-1850. In the severe epidemics, three or four out of every five who became ill, died.

Typhus fever, like other diseases, caused widespread disaster when it reached epidemic proportions. Suffice it to say that Napoleon's failure to conquer Russia was to a great extent due to the ravages of typhus fever. Furthermore, it has been estimated that between 1917 and 1923 there were 30,000,000 cases of typhus with 3,000,000 deaths in European Russia alone!

Since 1900, "Russia has suffered from two wars, one revolution, two cholera epidemics, from a famine unequalled since the Thirty Years' War from typhus, malaria, typhoid, dysentery, tuberculosis, and syphilis, to an extent unimaginable except to those who were spectators."

In thinking of the diseases that have caused havoc in the past we can list the big six of all times. They are plague, typhus, smallpox, cholera, dysentery, typhoid fever and paratyphoid fever. Man has learned enough about these particular diseases to control them pretty well. That is to say, epidemics are very unlikely to occur again.

Today we face new problems, In our day, there have been epidemics of influenza, meningitis, and infantile paralysis.

There was one epidemic of influenza in the 16th Century and one in the 17th Century. Five occurred in the 18th and three in the 19th. The pandemic of 1890 in Europe attacked one out of every two people.

In 1918-19 there occurred a world wide pandemic. It is estimated that there were 700,000,000 cases and 200,000,000 deaths. Of every 100 to fall sick, only one or two died. This is mild compared to the severity of plague and cholera in the past. In the United States one out of every four fell sick from influenza.

What was the cause of such sicknesses? Today, we know the cau of many of these diseases, but it is recently acquired knowledge. Until man discovered the actual causes there was much guessing--guessing so fantastic that it seems unbelievable. Influenza was thought to be due to the influence of the stars. Frequently evil spirits were blamed. The Romans believed that their Gods were unhappy. As a result they put the statues of their Gods into bed and honored them with feasts.

What did our ancestors do to prevent sickness? If they suspected evil spirits, they locked themselves indoors, sealed doors and windows to keep them out, and just in case any evil spirits had sneaked in while doors were being closed, they burned roots, onions, figs or whatever they believed would drive the spirits away. At times people tore out all their hair. At one time they dropped vinegar into the eyes of the sick, in an effort to keep them awake. To go to sleep was considered the worst thing that could happen. Others danced wildly in the streets, in a sort of hysteria. Such an act probably allowed disease to spread from person to person more rapidly.

Chapter 2.

THE DAWN OF TECHNIQUE

We are today relatively safe from epidemics of plague, cholera, smallpox, typhoid, dysentery and typhus fever. This is no idle dream. We have gained an advantage over our old enemies.

In 1837 it was discovered that fermentation and putrefaction were closely connected with the presence of bacteria (germs) derived from the air.

By 1857, Pasteur, the great French scientist, showed that alcohol was a result of fermentation. And that fermentation depended on the presence of bacteria. Six years later, he proved that a certain disease of silk worms was due to bacteria. Then he learned something else. He learned that heat could kill some of the bacteria he had discovered. Next, Pasteur attempted to keep some bacteria alive; he wanted to experiment with them.

He succeeded in "growing" in chicken broth the germs that caused cholera in chickens. One day he made an experiment by injecting into a well chicken some of the chicken broth in which were the "growing" germs. The chicken became sick and died. He tried this over and over again. Today, when we grow some germs on special type of food, such as broth, we refer to the broth as a culture. One day Pasteur injected a well chicken with some broth with germs that were a little older (perhaps several weeks) than he had used in previous experiments. To his amazement the chicken did not die. Hurriedly, he started another culture by adding chicken cholera germs to chicken broth. He allowed the culture to grow the same number of days as all previous cultures, except the one that failed to cause the death of the chicken in his last

experiment. Then he was ready for another experiment. Into a well chicken he injected a portion of the culture, just as he had done in so many past experiments. The chicken died as was expected. Into the chicken that had been injected with the old culture, he injected another portion of the new culture. What would happen? Would the chicken live or die? The chicken lived. This was an amazing fact. He did not understand it, but gave much thought to this phenomenon.

In 1876, another great scientist, Koch by name, succeeded in doing something that no one had been able to do so far. To go back a moment to the subject of cultures: Up to the time of Koch's discovery, no one had been able to grow just one type of germs in a culture. For some reason, cultures always contained other types of germs in addition to the one type particularly desired. Koch was the first person to succeed in growing a pure culture. Moreover, he made another discovery of great value. No one knew the cause of the disease called anthrax, which afflicted cattle, frequently causing death. He went a step further than anyone else when he cut open an animal dead of anthrax. The spleen was large and congested. From it he obtained some bacteria which he grew in pure culture. When he injected some of these germs into a well animal, it resulted in a sickness that was like the sickness of other animals suffering from the disease anthrax. In other words, Koch was the first man to successfully grow a pure culture of some germ. He was also successful in showing that anthrax was due to one particular germ. Some people who heard about these experiments began to have doubts about the orthodox beliefs of the causes of disease.

In 1884, the great Russian scientist, Metchnikoff, caused great excitement in that new group of scientists, like Pasteur and Koch, who

were so wrapped up in their work. Metchnikoff had made careful studies of bacteria. What did they do in the body of a man? What did the man's body do to the germs? He made this great discovery: Certain cells of the blood could "eat" the tiny bacteria. This phenomenon he called phagocytosis.

Meanwhile, all over Europe there was a great stir among scientists. Some argued that these discoveries were fantastic; others said it was all magic; still others rushed to Koch, Pasteur, Metchnikoff and other experimentors in order that they might see for themselves. While some men wrote articles to prove the impossibility of the existence of germs, others quickly learned the skills or technique of such men as Pasteur and Koch. Although they sought no reward, such men, driven onward by curiosity, soon found that bacteria were the causes of several other diseases. Between 1880 and 1890 they discovered the bacteria which were the cause of leprosy, gonorrhea, tuberculosis, typhoid fever, lobar pneumonia, diphtheria and tetanus.

Research or the search for new facts, was directed toward finding a way in which this new knowledge could be used constructively, that is, to some worthwhile use.

In 1894, Behring succeeded in making diphtheria antitoxin. Persons, mostly children, suffering from this dreadful disease, were given diphtheria antitoxin. The results were astounding. Instead of dying, the stricken patients got well.

Thus, in a relatively short space of time, the following techniques had been developed: obtaining bacteria from diseased men and animals; culturing bacteria; segregating or isolating from a mixture of bacteria growing in a culture, one particular type of bacteria, which could be grown into a pure culture; studying phagocytosis; making anti-

toxin. From this time onward, facts began to replace the guesswork; the theories and the fantastic beliefs of the past. Indeed, a new era in medicine and public health was to follow closely upon the dawn of technique.

Chapter 3.

BACTERIA

We now proceed to a study of bacteria. Germs, micro-organisms, organisms and microbes are other names for bacteria.

Suppose an Eskimo asked you to tell him what an automobile was like? To give him an answer which would be intelligent, it would be necessary to describe as accurately as possible the weight, size, shape, color, speed, etc. He might ask you what it eats. Then you would suddenly realize that it would be necessary to tell him that an automobile did not eat, because it was not alive. "But", he asks, "it moves, it has speed?"

In a study of bacteria, similar characteristics must be presented.

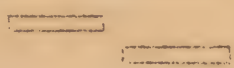
Definition of Bacteria. Bacteria (bacterium, singular) are minute, one-celled, plant like, microscopic organisms.

Distribution. They are universally distributed in soil, air, water and the human body. The mouth and throat contain enormous numbers. Milk and butter contain millions. In the large intestine of man, there are countless numbers; and a large part of the solid matter of the feces is made up of bacteria.

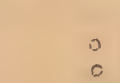
Size of Bacteria. An average sized bacterium is about 1/25,000 of an inch in size.

Shapes of Bacteria. There are three main shapes:

1. Bacilli (bacillus, singular) - rod-shaped organisms.



2. Cocci (coccus, singular) - round or oval shaped organisms.



3. Spirilla (spirillum, singular) - small, comma-shaped or cork-screw-shaped organisms which are motile.

Structure of Bacterial Cell. It is composed of a cell wall and cell content, including nuclear material. Through the cell wall pass food and waste products, both in solution (liquid form).

Motility. Some bacteria can propel themselves by swishing back and forth the flagellae attached to their cell wall.

Fig. 1-Flagella of a typhoid bacillus.

Reproduction. Bacteria multiply by division. That is, bacterium divides into halves, which grow into two bacteria, each capable of further division.

Spore Formation. Certain bacteria, when conditions are unfavorable, change into spores in order that they may be able to resist deleterious (harmful) influences better than in the vegetable state. Spores are highly resistant to heat, drying, and disinfectants.

Growth of Bacteria. Bacteria may reproduce by division at an average rate of every 20 minutes, but this rate cannot be maintained for long. Lack of food, lack of space, and their own production of acid interfere with unmolested growth. However, it has been estimated that one bacterium, if unhampered, could produce 74,000 tons of bacteria in 72 hours.

Environmental Factors in the Growth of Bacteria.

1. Oxygen.

   (a) Some organisms grow best in the presence of free oxygen. They are called aerobes.

   (b) Some grow best in the complete absence of oxygen;

others in the partial absence of oxygen. Both types are called anaerobes.

2. Temperature.

(a) Bacteria die if the temperature is over 160° C or below - 250° C.

(b) Bacteria can carry on activity at temperatures ranging from 0° to 90° C. (Water freezes at 0° C and boils at 100° C.)

(c) For each organism there is:

1. An optimum temperature, that is best suited to its growth.
2. A minimum temperature, the lowest temperature at which it will grow.
3. A maximum temperature, the highest temperature at which it will grow.
4. The thermal death point, or death range, is the temperature which in a given time destroys bacteria. Moist heat (as steam) at 120° C for 20 minutes kills all bacteria and spores because moist heat is penetrating. At 100° C (boiling) all bacteria, in the vegetative form, are killed in 5 to 15 minutes.

3. Sunlight. Most bacteria are destroyed by sunlight within six hours.

PATHOGENICITY. Bacteria that are capable of producing disease in man are called pathogens or parasites. Those bacteria that do not cause disease in man are called non-pathogens or saphrophytes.

To say that diphtheria is pathogenic to man, means that diphtheria germs can produce diphtheria in man. Germs that are pathogenic to man require food, warmth, moisture and darkness - all of which are found inside the human body.

Non-pathogenic germs are present in the body of man, mostly inside the intestinal tract. These germs serve useful purposes. For instance, bacteria play an important part in the digestion of foods.

Classification of pathogenic organisms:

1. Protozoa - animal kingdom.

The parasite that causes malaria, and the ameba, a single celled animal, that produces amebic dysentery are both examples.

2. Bacteria - vegetable kingdom.

The bacteria that cause diphtheria, plague, typhoid, and botulism are examples.

The diphtheria germ can cause only one disease, namely diphtheria. Each disease is produced by just one specific germ.

3. Rickettsia -

These are smaller than bacteria. As a rule, they are considered to be parasites of insects.

Among the diseases caused by rickettsia are:

Typhus fever

Trench fever

Rocky Mountain Spotted fever

Japanese flood fever or Tsutsugamuski Fever.

4. Viruses

Viruses are extremely tiny and only very recently has there been constructed a microscope powerful enough to "see" these very small bodies.

The following diseases are attributed to viruses:

Smallpox	Psittacosis or parrot fever
Cowpox	Lymphogranuloma inguinale
Chickenpox	Infantile paralysis
Verruca or warts	Epidemic encephalitis
Measles	equine encephalitis
Epidemic influenza	Yellow fever
Mumps	Pappataci fever or sand-fly fever
Rabies	

Probable Virus Diseases:

Common cold

Trachoma

German measles

Dengue Fever

If the cyst (a resting stage of the ameba) that causes amebic dysentery were as large as a basketball, the streptococcus (bacterium) that makes throats sore would look like a big marble and the virus of influenza would be about the size of birdshot. The head of a pin would accommodate between 10 and 20 million viruses of poliomyelitis.

The disease producing protozoa, bacteria and rickettsia have one thing in common - they are parasites. Parasitism is a way of life, the parasites' way of life A parasite lives in or on some other form of life, receiving food, comfort, moisture--in fact, satisfactory lodgings. Moreover, they perform no duties that are in the least bit useful to the one who furnishes lodgings.

Chapter 4

INFECTION AND IMMUNITY

Now that you have some conception of the general characteristics of bacteria, you are in a position to learn additional facts, which are essential to a basic understanding of hygiene and sanitation.

How can bacteria get into the body? Or to put the question another way, at what points can bacteria invade the body? The answer is: The body can be invaded at four places.

1. They can enter via the mouth (intestinal tract)
2. They can enter via the respiratory apparatus (nose, mouth)
3. They can enter via the external sexual organs
4. They can enter via a puncture or tear of the skin or mucuos membranes.

Sometimes these invasion points are spoken of as portals of entry.

What do the bacteria do, once they enter the body? For some unknown reason bacteria tend to go to certain definite parts of the body. For example, should pneumonia, diphtheria, and typhoid germs enter via the mouth, this would happen: pneumonia, germs would go to the lungs; diphtheria germs would go to the throat and tonsils; typhoid germs would go to the intestines. And another important feature is multiplication, which would begin almost at once after invasion.

What might the bacteria do to the body (host)?

The tissues might be affected with such possible results: (1) degeneration of cells and tissues, with possible resulting death of cells and tissues.

(2) hemorrhages in the areas where bacteria destroyed small blood vessels.

(3) the production of an exudate.

7 Moreover these symptoms might occur: fever almost always; increased metabolism almost always; functional or organic disturbances, such as diarrhea, cyanosis or delirium; or, such organic changes as, paralysis, deafness, blindness, heart disease.

What happens to the host? He gets well, dies or he may not become sick.

What happens to the parasites? They either win or lose. If they are very strong or powerful (virulent) they may succeed in overcoming the host. Or they may be quite weak (avirulent) and the host quite strong. In that case the host wins, the bacteria fight a losing battle and die out.

What can the body (host) do to protect itself against the bacteria after they have made a successful invasion? In other words, what are the body's defenses? It is sometimes said that the body has three main lines of defense.

The first is the skin. It covers the whole body and like armor it protects the tissues beneath from the bacteria with which our skins come in daily contact. Once it is broken bacteria may enter through the break. Some of the bacteria that may enter are: tetanus, gas gangrene, anthrax, streptococci, and staphlococci.

Now for the second defense. We will assume that bacteria have been successful in penetrating the skin or that they have entered the body via any of the other three invasion points. In less than 20 minutes after the bacteria have entered, the second line defenses are called out. It is necessary to digress a moment. At all times blood is traveling through all the canals of the body. In the blood are many, many, substances, including certain single cells - red blood cells, which carry oxygen from the lungs to every cell of the whole

body, and white blood cells, the second line defense. Some of these cells have one, two, three or more nuclei, sometimes six or seven. Moreover, they have motility, that is, they can move under their own power. When bacteria get into the body, these white blood cells or phagocytes very quickly direct their energies toward seeking out the bacteria. One of the amazing characteristics of the phagocytes is their ability to actually go through the wall of a small blood vessel. Once white cells have squeezed themselves through a blood vessel wall, they immediately proceed to the area of the invaders. The general tactics of the phagocytes is first to surround the bacteria, thus localizing the field of combat to as small an area as possible.

Immediately the white cells or phagocytes start active warfare. By a complicated process, one phagocyte succeeds in getting a single bacterium to pass through its cell wall; the bacterium then finds itself inside the phagocyte. This process of "eating" bacteria continues. All phagocytes participate; some of them may be successful in cornering and enveloping 20 to 30 bacteria. Once the bacteria are inside a white blood cell, they are said to be intracellular (within-cell). In time the bacteria are broken up and digested, much as is food that you and I eat. But the life of a phagocyte is not long. Very soon it begins to degenerate, swell up, and disintegrate (fall apart). These degenerated phagocytes, plus blood serum, digested bacteria and destroyed tissue (the terrain demolished at the site of the battle) constitute what we call pus.

But who wins? The invaders or the phagocytes? The answer is more complicated than saying "victory goes to the side with superior numbers", so we will postpone an answer at present.

An understanding of the mechanism of the third line of defense deserves our attention at this moment. As an aid in comprehending this complex system, this question can be asked: Why do people never (or hardly ever) get a second attack of diphtheria, or typhoid fever, or measles: In other words, why are they safe from a second attack? Instead of saying a person is safe from attack, we express the same idea by stating: he is <u>immune</u> to (safe from) diphtheria, or typhoid fever, or measles. (When a person is not immune to some particular disease, he is said to be <u>susceptible</u> to it).

Now that you have an understanding of these new words, it is possible to unfold the complexities of the third line of defense. Before you "got" measles, you were susceptible to measles. After you recovered from measles, you were immune to future attacks of the same disease.

How does one become immune? Let us use typhoid fever as an example, because the mechanism of producing its immunity is easier to understand. For the purposes of illustration, we will assume that Jones is the subject. Before Jones "got" typhoid fever he was susceptible to the disease. Upon recovery, he became immune.

Let us start at the very beginning. Jones is perfectly healthy. He drinks some water from a clear stream (bad personal hygiene). There happens to be great numbers of typhoid germs in the cup of water he drank. The typhoid bacilli therefore invade by way of the mouth. They proceed to the small intestine and prepare to "dig in", that is, to burrow beneath the inside lining of the intestine. As they "dig in", the second line of defense goes into action. They quickly speed to the areas where the bacteria have lined up. The battle goes on. As a rule the typhoid bacilli invade in numbers far superior to those of the phagocytes.

While the white cells are desperately striving to hold the enemy, the third line of defense mobilizes on the production line. It reminds one of giant war industries which require time to produce. The first signal to start production comes from the typhoid germs themselves. As they begin to "dig in" Jones' blood and tissues, realize that they are dealing with typhoid bacilli. Defense weapons must be made -- defense weapons which will be effective against the bacilli of typhoid fever. We humans really calculate in a similar way. When tanks first appeared on the battlefield, methods of defending ourselves were considered. In time we developed anti-tank weapons. So too we developed anti-aircraft weapons, anti-submarine weapons; and the challenge of new offensives is constantly met with new defensive weapons.

Typhoid bacteria attack Jones, whose body in turn produces defense weapons, called antibodies. At first the production of antibodies is too meager to be of any real value. By the third week antibodies are rolling off the assembly line in extraordinarily great numbers. From then on, the bacteria begin to lose. Victory is in sight.

It is only fair to say that the bacteria do not always lose. They may win, that is, cause the death of Jones (the host). For example, the numbers of typhoid germs may be so great that they overcome the host before the body has time to produce antibodies in sufficient numbers to save the day. Or, the bacteria may succeed in burrowing all the way through the intestine (a very deep fox hole) in which case the intestinal contents ooze into the peritoneal cavity, resulting in peritonitis, a serious complication (which may cause death).

Third, the bacteria may burrow through the wall of a blood vessel. From such a hole, blood escapes, thus causing a serious complication,

namely, hemorrhage. The host may die, unless the hemorrhage is stopped rather quickly and that requires an operation.

There is an idea of a theory to explain the production of antibodies. It is similar to the law of stimulus and reaction. Sit on a thumb tack (pain is the stimulus) and you jump up very quickly (reaction). Or, if the body gets too warm (stimulus) in a hot climate, sweating (reaction) takes place. If you put something very bitter (stimulus) in your mouth, you spit it out (reaction). Of course there are many such examples, but there is no need of further illustration. The theory of antibody formation assumes that bacteria (stimulus) in the body, causes antibodies to be made (reaction). It is thought that they are made in the blood rather quickly (less than 1 hour) following the appearance of bacteria. Moreover, it is believed that antibodies are made of protein, which the body furnishes for the purpose. (The white of an egg is protein). The theory goes on to say that the antibodies are deadly enemies of the germs, that they lock in battle, the final result being the loss of both bacteria and antibodies, In an attempt to explain this locking of bacteria and antibodies, the chemists here proposed another theory. It is really easy to understand, provided you know a little about electricity. Bacteria, it has been found, carry a negative charge of electricity while immune blood serum (the liquid part of blood in which antibodies are present) carries a positive charge. Hence, bacteria (-) and antibodies (+) are attracted to each other. The result is a tangle which results in clumping of bacteria and antibodies. When bacteria get into such a snarl it reminds one of a fly caught in a spider web.

Now we can return to Jones. We left him a sick man. The phagocytes were fighting and the production of antibodies had just started. Three or four weeks later Jones is out of all danger. Typhoid fever

has left him weak, but he will soon be strong again.

Will he get typhoid again? He probably will not. Why? Because his body possesses numerous antibodies which are ready for immediate action should typhoid germs again be successful in invading Jones' body. However, should great numbers of typhoid bacilli gain entrance, he might suffer a second attack. This assault would probably be mild, because the numbers of bacteria, not eliminated by antibodies, would be relatively small.

Would these antibodies protect him from other diseases? No. Because typhoid antibodies protect only against typhoid germs. Measles antibodies protect only against measles viruses. The same is true of diphtheria. In fact the same is true of all diseases. For every type of bacteria, specific antibodies alone are of value.

Jones has immunity to typhoid fever. He obtained it the hard way. But you, too, have immunity to typhoid. And how did you secure it?

Instead of swallowing live typhoid germs (a dangerous thing to do) you have been injected with dead bacilli. These dead germs, composed of protein, act as a stimulus which results in the production of antibodies within your body! You were susceptible to typhoid fever before the injection, now you are immune. Like Jones you are not absolutely 100% immune. If you drink unsafe water, you might get typhoid fever - you might get more bacilli than your antibodies can handle on a minute's notice.

Vaccination is the process of protective inoculation against some disease, as small pox. For example, vaccination against smallpox is done in this manner: A small amount of lymph (containing small numbers of small pox viruses) from cowpox is rubbed into an area of your skin

which has been scratched just enough to break through the skin--the line of first defense. In this manner, the viruses enter the body, a local "sore" develops and antibodies are produced. Thus you are made immune to small pox.

Yellow fever vaccination is performed by inoculating yellow fever viruses, which have been greatly weakened. Bacteria and viruses, you recall, tend to become stronger or, as we say, virulent, when they live and grow in a host. On the other hand they tend to lose their virulence and become weak when they grow in culture media. In fact it is necessary to attenuate them (cause them to lose virulence) before they can be employed for purposes of inoculation. Great numbers of attenuated bacteria or viruses cause the production of antibodies. But they are too weak to cause the disease.

One more example of a method of vaccination. Tetanus bacilli have the property of producing a liquid poison, called toxin. This toxin is the trouble maker when it gets into our bodies. The toxin stimulates antitoxin, which acts like other antibodies. When some of the powerful tetanus toxin is collected, a little formalin is added; it is then allowed to remain in a bottle at a certain temperature for a month or so. By this time the toxin is much weakened, and hence ready for inoculation. The weak toxin (now called toxoid) stimulates antibody formation, the object of vaccination.

Until recently we gave anti-tetanus serum to anyone who might develop tetanus (for example, persons with gunshot wounds). Anti-tetanus serum is really horse's blood serum containing tetanus antibodies. Such a serum was obtained by injecting a well horse with some tetanus toxin. When antibodies had developed, the horse was bled

of a quart or so of blood, the serum portion of which contained tetanus antibodies.

One final remark. Listed below are the factors which determine whether or not a disease will develop in a person:

1. Susceptibility.
2. Virulence or disease producing power of the organisms.
3. The number of germs that successfully invade the body.
4. The invasion point.

   Tetanus bacilli do not cause disease when they enter via the mouth.

5. The defenses of the body.

   In a weakened condition all defenses are below par.

Chapter 5

COMMUNICABLE DISEASES AND THEIR CLASSIFICATION

What is a communicable disease? "A communicable disease is a disease caused by the invasion of the tissues of the body by living organisms which can be and are transferred from one human host to another. The term "communicable disease" is synonymous with infectious diseases, contagious diseases and epidemic disease."

Communicable diseases are usually classified as (1) "EPIDEMIC, when there occurs in a limited time among a limited population an unusual number of cases of a communicable disease; (2) PANDEMIC, when the population concerned is much larger - that of an entire country, or even a continent; (3) ENDEMIC, when the disease is prevalent in the usual numbers that is observed in a given population and there is no increase in the number of cases."

What is the purpose of Hygiene and Sanitation? The purpose of Hygiene and Sanitation is twofold: (1) To present for study the underlying facts or principles of communicable diseases - their causes and their method of spreading, and (2) to present for further study: (a) the methods which men, in cooperation with each other, can employ to defend themselves as a group.

We speak of: fire protection, bomb protection, safety first, and many other measures based on guarding our good health. Hygiene and sanitation is another way of saying "Guard your own health and the health of the group in which you live."

In a broad general way it can be said that certain principle factors play a part in the development of communicable diseases. These factors are:

1. Sources of Infection or Bases of Supply of Bacteria.
2. Transmission Agents or Supply Lines (Vehicles).

3. Environmental factors.

4. Susceptibility of Individuals.

The above is given below in more detail.

1. Sources of infection - these are important facts.

The bacteria that cause communicable diseases are always in circulation. There are only three places where they canbe found:

a. in cases or those people who are sick as a result of some communicable disease. Cases have: the infecting organism in their bodies, and they have certain symptoms of sickness.

b. carriers, or those people who carry in their body the infecting organisms of some disease. They have no symptoms; they are not sick.

c. infected animals or those animals that have in their bodie. the organisms of some infectious disease.

Tetanus and gas gangrene are not usually thought of as communicable diseases.

From the above sources or supply bases come all organisms which cause infectious diseases.

It is obvious that 100 bases of supply of typhoid germs (100 cases) are a much greater danger to a community than would be 5 bases of supply. To put it another way, 100 bomber planes overhead can supply vastly more bombs than can 5 bomber planes.

2. Transmitting agents.

In getting supplies from one place to another, transportation is necessary. Army supplies are transmitted by air, by water, and by land--some examples of the latter are: railroad and truck. Parasites are carried from supply bases to susceptibles by means of the followi

transmitting agents or lines of communication:

1. Food, including milk
2. Water
3. Insects
4. Contact

IMPORTANT FACTS

   a. Direct
      1. Kissing
      2. Sexual Intercourse
   b. Indirect
      1. AIR
         a. sneezing
         b. coughing
         c. spitting
      2. FINGERS
      3. Flies
      4. Fomites
         a. Substances other than food that may harbor or transmit organisms. They get germs as a result of being handled by cases or carriers. Examples are: cigars, cigarettes, musical instruments played by the mouth, mess gear, handkerchief, books, magazines, linen, etc.

When these vehicles carry pathogenic organisms in sufficient numbers to cause disease, they become dangerous from the point of view of a community's health. A break in any of the measures used to control their transmission, may lead to an epidemic or pandemic.

3. Environmental factors.

We can defend ourselves by adjusting our environment in such a way

that the lines of communication are broken down and ineffectual as a means of transmitting disease from a source to well people. Your environment is made up of those people and things that you think of as your surroundings. Some examples are:

water	ventilation
drinking and bathing	heating
food	lighting
milk	mess hall
garbage	movies
sewerage	post-exchange
latrines	restaurants
insects	patients
barracks	other well people

Certain control measures to prevent illness are in effect all the time. Laxness of control may lead to epidemics. For instance, food and water may become dangerous as a result of negligence, the acts of enemy agents, or as a result of the hazards of warfare.

Scarcity of water may lead to a dirty body, lousiness and disease; typhus fever for example.

4. Susceptibility

Epidemics are more apt to develop if the number of susceptible individuals is large rather than if the number is small. Consider, for example, the possibilities of a typhoid epidemic in a camp of 20,000 men, none of whom is immunized; as contrasted to a camp of 20,000 men, all of whom are immunized?

Secondly, it can be stated in a general way that susceptibility to disease increases when the following conditions are present: malnutrition or excessive fatigue, or both.

Classification of Communicable Diseases.

Communicable diseases classified according to their method of transmission as:

1. Venereal Diseases

   These diseases are spread by direct contact (kissing and sexual intercourse), rarely by indirect contact.

2. Respiratory Diseases.

   These diseases are transmitted by contact (kissing, air, fingers, flies, fomites).

3. Intestinal diseases

   These diseases are transmitted by food and water; fingers, flies and fomites.

4. Insect borne diseases.

   These diseases are transported by insects, such as mosquitoes, lice, fleas, flies and ticks.

5. Miscellaneous diseases.

   These diseases are not spread in the usual meaning of the word, hence are combined together in a miscellaneous group.

Chapter 6

PRINCIPLES OF DEFENDING THE BODY AGAINST BACTERIAL INVASIONS

In order to keep ever before us the basic principles, it is justifiable to repeat what has been stated before: certain basic factors play a part in the creation of communicable diseases. They are:

1. The sources of infection
2. The transmitting agents
3. Susceptibles
4. Environmental factors.

There are two methods of defending the body against invasion by parastic organisms:

1. Natural defenses

   Such as skin, phagocytes, and antibodies.

2. Artificial defenses or the application of control measures based upon the principles of communicable disease. These include all the methods we employ in an effort to add to the defenses that nature gives, without any effort on our part. The methods employed are measures to maintain health.

Since a study of natural defenses was presented in Chapter IV, we will proceed at once to a study of the artificial methods.

A. Artificial defenses against

1. The sources of infection. They are cases, carriers, and infected animals. There are two definite measures of value:

   a. Make the source non-infectious.

This means that a procedure must be used which will remove the offending organisms from the body. Some methods are:

(1) The use of drugs such as quinine (used for treatment of malaria): sulfa drugs; (pneumonia, meningitis due to meningococci, [illegible] and some other diseases; arsphenamine (syphilis).

(2) the use of serum (antibodies) in such diseases as pneumonia, meningococcic, meningitis, and anthrax.

(3) The use of antitoxin in such diseases as: diphtheria, tetanus, and scarlet fever.

(4) The use of fever therapy in some types of complications due to gonorrhea.

(5) The use of medical or surgical procedures as a means of eliminating the parasitic organisms from carriers.

b. Elimination of certain sources of infection (infected cattle)

(1) Tuberculous cattle may excrete the germs of tuberculosis in the discharges from the respiratory tract and in the feces, urine and milk. To prevent the transmission of tuberculosis from cattle to man by milk and milk products (cheese, butter, ice cream) animals with tuberculosis are eliminated by destruction.

c. Isolate the sources of infection.

(1) Isolation

When it is impossible to make cases non-infectious, the method of isolation is employed as the only means of protecting the "crowd" from a source. Since the object is to protect the community, a case is kept either indoors

at home or in a hospital away from other members of the community, until he is no longer a source of parasitic organisms - the offending organisms leave the body shortly after the patient becomes again well.

(2) Concurrent disinfection

Since a case harbors parasitic germs, it is necessary to take measures to constantly destroy the germs that leave his body in sputum, droplets, vomitus, feces, and urine by means of various agents - such as boiling water, steam, chemicals, and sunlight.

(3) Terminal disinfection

Furthermore, after the patient becomes well and leaves his room, it is necessary to clean his surroundings thoroughly for the express purpose of destroying any pathogenic organisms, which came from his body during his illness. Chemicals, gases, soap and water, and sunlight are the usual disinfecting agents employed.

2. Transmitting agents (supply lines, communication lines, vehicles) The primary object is to "cut the lines of communications". For example, mess sanitation interferes with the progressive advance of pathogenic organisms - to interfere with military advance, land mines may be used. Purifying water (killing pathogenic organisms) for drinking purposes might be comparable to destroying an enemy transport ship.

Insects are another type of transmitting agents. Our attack is based on their characteristics. For example, it is in water that one finds mosquito eggs, which later develop into larvae, pupae, and finally into adults. We use one type of offensive

measures to eliminate their breeding places and another type to destroy the larvae, and the pupae. On the other hand, the flying adults force us to employ defensive instruments of self protection. Compared to modern warfare, there is not a great difference. Certainly attempts are made to eliminate airplane factories (breeding places) by bombing them to ruins; furthermore efforts are directed toward the destruction of planes on the ground; and lastly is it not true that flying planes often force their adversaries to make use of such defensive devices as bomb shelter, helmets, blackouts, and anti-aircraft gunfire and fighter planes?

Contact, the fourth principal means of transportation, is a little more complex than the other lines of transportation. There are important ways to keep the air from becoming a dangerous system of carrying germs to us: (1) proper bed spacing is an example of heeding the sensible remark: "Keep your distance"; (2) a proper ventilation, which allows bacteria laden air to be removed.

Good personal habits imply good personal hygiene. Such habits are: covering sneezes and coughs with a handkerchief; careful washing of our hands before eating as well as equally careful washing after going to the latrine; and lastly the excellent rule, to put into our mouth nothing which we do not fully intend to eat.

3. Susceptibles

We can think of the susceptibles as the last line of defense, and serious slip-ups in defense at this point

may lead to real trouble - a sick individual, maybe an epidemic.

There are four general ways in which susceptibles may obtain protection in addition to their own natural defenses:

1. Providing an environment that will prevent or limit the dissemination of infective material - ventilation, heating, lighting, and cleanliness; insect control; rodent control.

   (ENVIRONMENTAL MEASURES)

2. Measures designed to maintain the health and vitality of the soldier: proper clothing, exercise, sleep, and PERSONAL HYGIENE.

3. IMMUNZATION

4. The ISOLATION of the sick, the QUARANTINE of contacts, separating them from the well in order to prevent further spread of the disease.

Summary

The body can be defended against the invasion of bacteria by:

A. Natural defenses:

   1. Skin

   2. Phagocytosis

   3. Antibodies

B. Artificial defenses against

   1. The sources

      a. Make sources non-infectious by use of:

         (1) drugs, serum, antitoxin, fever therapy

b. Eliminate certain sources of infection

c. Insolation of the sources by:

(1) isolation

(2) concurrent disinfection

(3) terminal disinfection

2. The transmitting agents

3. The susceptibles

(1) Environmental measures

(2) Measures to maintain health

(3) Immunization

(4) Isolation and quarantine

NOTE CONCERNING THE ABOVE OUTLINE

A word of caution should be said about this outline. Do not let its simplicity lead you to hope for simple answers of how to control (defend against) certain diseases. However desirous this would be, it is impossible because there is so much overlapping. For instance, mosquito control comes under such topics: (1) control of transmitting and (2) environmental measures. Another example is that of the importance of the fingers in spreading disease. This subject could be partially covered under the heading "control of transmitting agents". To receive the full consideration it deserves it is further discussed under the subject of personal hygiene.

CHAPTER 7

VENEREAL DISEASES

I. The five diseases claimed as venereal are-

A. Gonorrhea. - Caused by the gonococcus.

B. Syphilis. - Caused by a corkscrew-shaped organism; the Treponema pallidum

C. Chancroid. - Caused by the bacillus of Ducrey.

D. Lymphogranuloma inguinale.- Caused by a filterable virus

E. Granuloma inguinale. - Probably caused by Donovan body.

II. Importance

Venereal diseases are the most important cause of non-effectiveness (see glossary) among troops.

III. Sources of Infection

A. The infected prostitue is the primary source.

IV. Transmission

A. Primary by direct control (sexual intercourse)

B. Only rarely, and under certain conditions, is syphilis transmitted by the common drinking cup, and other fomites (cigars cigarettes, mouth musical instruments): kissing; or by being bitten by a woman who has open lesions (sores)in her mouth.

V. Control measures.

A. Prevent exposure to venereal infection.

B. Prevent the development of the infection in exposed individual (prophylaxis).

C. Educational measures.

For details of control, see Chapter XIV

Following are some brief statements regarding the nature of several venereal diseases, gonorrhea and syphilis.

GONORRHEA

1. It is the commonest cause of congenital blindness. The application of control measures is evidenced by the fact that state laws require that silver nitrate be instilled into the eyes of the new-born in order to kill any gonococci that may be present.

2. It is the commonest cause of sterility in women.

3. Alcohol (even beer and wine) and intercourse often cause the "cured" case to start over again (not a new infection).

SYPHILIS

History

1905 - Schuman discovered the spirochete, the cause of syphilis.

1910 - Erlich discovered arsphenamine.

1913 - Noguchi found spirochetes in the brains of paretics.

Transmission

1. By direct contact
   a. Sexual
   b. Kissing
   c. Examination of infected patients and as a result of accident or carlessness, becoming infected.
2. By indirect contact (unusual)
   a. Cigarettes, drinking cups, etc.
3. Congenital (born with the disease)

Stages of syphilis

1. Chancre - appears 10 - 60 days after exposure.
2. Secondary - spirochetes in blood, mucous patches, skin, and often in the spinal fluid.

3. Latent period - 2 weeks to 30 years in duration.

4. Tertiary

Systems of the Body That Can Become Involved

Skin and mucous membrane

1. Macular eruption (skin eruption)
2. Condylomata (warts)
3. Mucous patches
4. Gummata

Bones

1. Pains in bones in early stages
2. Headaches and neuralgias
3. Periostitis
4. Vertebrae
5. Arthritis

Circulatory System involved in 13% of cases

1. Aortitis
2. Aortitic insufficiency

Respiratory system

1. Hoarseness
2. Aphonia (loss of voice)
3. Ulceration of larynx
4. Gumma of lungs.

Digestive

1. Stomach pains - occasionally, much like duodenal ulcer pains
2. Liver - frequent involvement
   a. Gumma
   b. Hepatitis
   c. Cirrhosis

Kidneys (rare)

1. Nephrosis

Nervous system

1. Meningeal syphilis
2. Cerebrospinal syphilis
   a. Vascular
   b. Parenchymatous
      (1) Paresis
      (2) Tabes dorsalis

Eyes

1. Optic neuritis

   75% become blind in 5 years without treatment

   28% become blind in 3 years with treatment

   100% become blind in 8 years with treatment

Treatment consists of:

a. Subdural injections

b. Fever treatments

Below is a brief outline of some of the features of tabes dorsalis and paresis.

Tabes dorsalis - locomator ataxia

1. Pain, types of
   a. Legs - lightning in character
   b. Crises, types of
      (1) Gastric
      (2) Rectal
      (3) Laryngeal
2. Ataxia - incoordination

3. Senses

a. Anaesthesia, hypesthesia

b. Position sense lost - (toe, etc.)

4. Loss of sphincter control of urinary bladder, causing

a. Dribbling

5. Optic atrophy (blindness)

a. Resulting from optic neuritis

6. Trophic changes

a. Charcot joint - knee, ankle, hip

(1) Due to a loss of the muscular protection of the joint.

7. Motor palsies

a. Lid droop (eye)

b. Double vision

Paresis -

General - occurs in 3% of all cases

it is three times more common in men than women

there is a general shrinking of the brain.

Symptoms and Signs -

Stage I

Personality changes

Irritability

Careless about clothes

Poor judgment

Absent mindedness

Inability to concentrate

Slow to understand

Depression or

Euphoria

Tremors in

Hands

Tongue

Speech

Slurring of words: as "Methodist Episcopal" and "third riding artillery brigade."

Stage II

Euphoria, grandiose ideas (wealth, power)

Depression

anxiety, fear, self accusation

Simple dementia

Paranoid ideas

There may be seizures - epileptiform

Stage III

Great weakness and death

Bedridden

NOTE

Many people who do not have syphilis have many of the symptoms of paresis. Because you can't concentrate, as an example, don't think you have syphilis. This is a common error people make on reading about diseases.

Lastly, a word about congenital syphilis

Of 685,000 cases under treatment in the United States,

60,000 are congenital, and congenital syphilis can be prevented.

Fig. 1 Diagram to show how pathogenic organisms can be transmitted by contact. Contact between the source and susceptible may be direct, (kissing); or it may be indirect (air, food, fingers, fomites, etc.)

CHAPTER 8

THE RESPIRATORY DISEASES

The Respiratory Diseases are:

Bronchitis, acute
Chickenpox
Coryza (common cold)
Diphtheria
Influenza
Laryngitis, acute
Measles
Meningitis, epidemic
Mumps
Plague, pneumonic
Pneumonia
Poliomyelitis
Scarlet Fever
Septic Sore Throat
Smallpox
Tonsillitis, acute
Tuberculosis
Vincent's Angina
Whooping Cough

General Remarks:

1. Respiratory diseases are the leading cause of admission to the sick report.

2. They are especially prevalent during the winter and spring, and when large groups of recruits (crowds) are assembled.

3. Some of these diseases many of us have had during childhood-childhood diseases such as Measles, mumps, chickenpox, diphtheria and whooping cough.

4. It is important to prevent the "insignificant" common cold as much as possible because the presence of a cold probably allows pneumonia to develop more easily.

5. Respiratory diseases are primarily spread by contact.

6. The Control of Respiratory diseases is difficult because: (1) They are easily transmitted, (2) People are generally susceptibile to them, (3) The scarcity of specific protective measures.

7. Not infrequently milk (usually unpasteurized) carries these respiratory diseases: Scarlet fever, diphtheria, septic sore throat.

OUTLINE OF CONTROL MEASURES

SOURCES	CONTROL MEASURES
I. Cases, Carriers	isolation, disinfection
TRANSMISSION	
II. Contact	
A. direct	
1. kissing	Personal hygiene (P.H)
B. indirect	
1. air	Prevent overcrowding Barracks cleanliness Ventilation
a. Sneezing, coughing, talking	Personal Hygiene
2. fingers	Personal Hygiene
3. fomites	P.H.; Mess sanitation
III. Susceptibles	Protective Measures a. suitable clothes b. quarantine suspects c. medical inspection d. hospitalize suspects e. immunization f. P.H. Personal Hygiene

CHAPTER 9

INTESTINAL DISEASES

The Intestinal Diseases are:

Typhoid Fever	Cholera
Paratyphoid Fever	Helminthic Infestations (Worms)
Common Diarrhea	Undulant Fever
Bacillary Dysentery	Food Infection
Protozoal Dysentery	Botulism

Undulant Fever is not, strictly speaking, a communicable disease, as it is not normally transmitted from person to person. However, it can be transmitted from animals to man by food, and for this reason, it is included in this group.

1. Carriers of typhoid fever, amebic (protozoal) dysentery, or other of the intestinal diseases are relatively common.
2. Common diarrhea occurs more frequently than any of the other diseases, due to: (1) living in close quarters, (2) poorly constructed or improperly maintained latrines which allow flies to spread the causative organisms.
3. Typhoid fever, like cholera, lingers where sanitation is primitive.
4. Prevention of intestinal diseases rests solely on the sanitary control of feces and urine.
5. It has been said that intestinal diseases are caused by the transmission of the causative organisms "from one man's intestine to another man's gullet."
6. The sources of infection are forever present among the military and civilian populations.
7. The prevalence of these diseases depends upon the degree of control measures inforced.

8. The causative organisms invade the body via the mouth.

9. Food and water are by far the commonest means of transporting the organisms.

10. The organisms of typhoid fever, tuberculosis, bacillary dysentery, common diarrhea, amebic dysentery, and undulant fever, as well as the common parasitic worms are usually carried by food. Typhoid fever, the common diarrheas, and undulant fever are most commonly transmitted by milk.

OUTLINE OF CONTROL MEASURES

	SOURCES	CONTROL
I.	cases, carriers and infected animals	isolation and quarantine disinfection
	TRANSMISSION	
II.	Food -	Inspection of food Protection of food Preparation of food Clean utensils Serving Food Food handlers Proper waste disposal
III.	Water - - - - - - - - - - - - - - - - - - -	Protect raw water by proper sewage disposal Purification
IV.	Flies - - - - - - - - - - - - - - - - - - -	Fly control
V.	Hands - - - - - - - - - - - - - - - - - - -	Personal hygiene
	Susceptibles - - - -	Protective measures: Quarantine Medical inspection Hospitalize suspects Immunization Personal hygiene

CHAPTER 10

INSECT BORNE DISEASES:

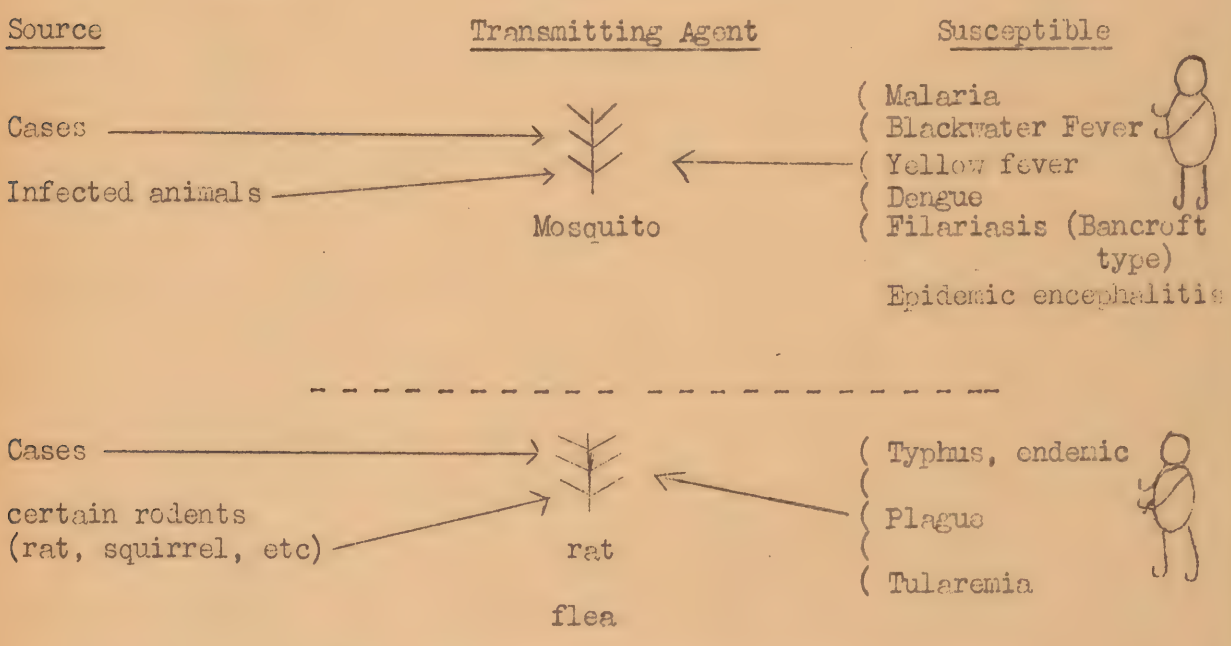
Definition. Insect-borne diseases are those diseases which are usually transmitted by blood sucking insects.

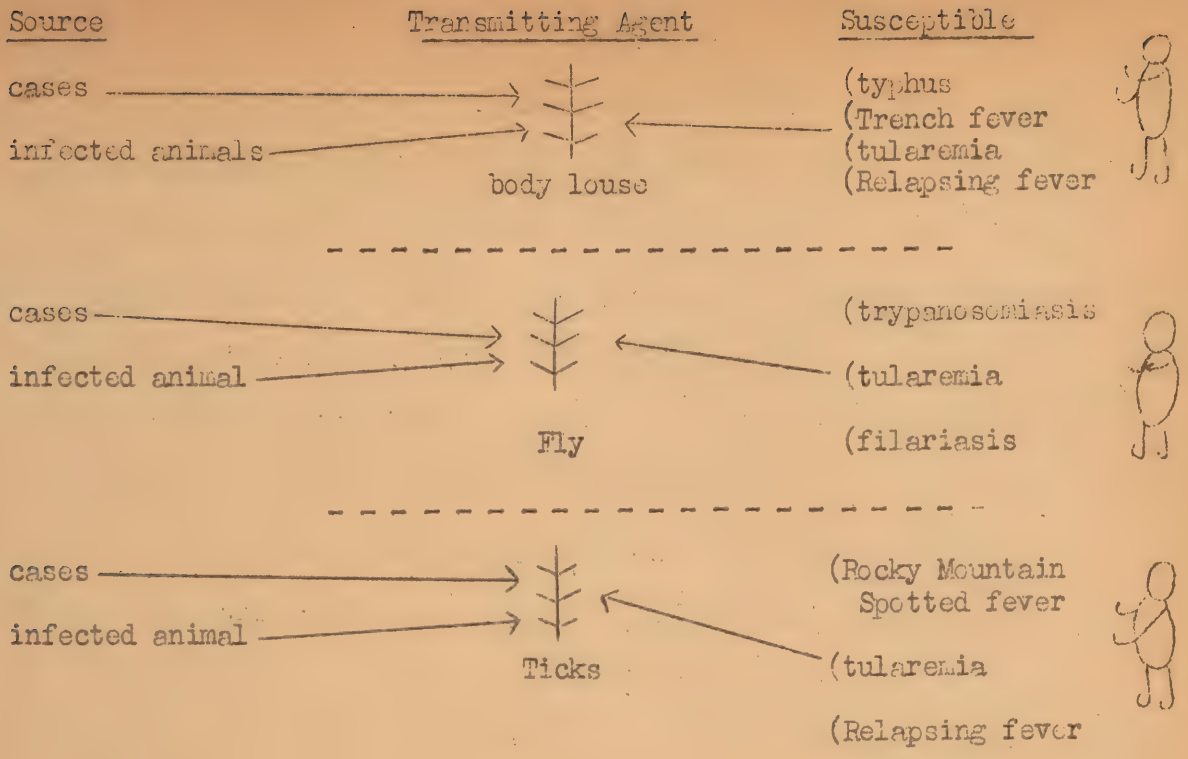
Diseases of this group are:

Malaria	Relapsing Fever
Yellow Fever	Filariasis
Dengue	Rocky Mountain Spotted Fever
Plague	Tularemia
Typhus	Trench Fever
	Epidemic encephalitis

The insects (vectors) are:

mosquito	tick
flea	fly
louse	bedbugs (European)





General Remarks

1. Insect borne diseases are usually transmitted by blood sucking insects.
2. Insects which transmit diseases to human beings or animals are known as vectors.
3. Trench fever, typhus fever, and relapsing fever are true military diseases in the sense that they prevail to a much greater extent among troops than in civilian communities.
4. The Rickettsial diseases are: typhus fever, Rocky Mountain Spotted fever, tsutugamushi and trench fever.
5. An incomplete list of infected animals is: monkeys, prarie dogs, squirrels, rabbits, woodchucks, and rats.
6. Transmission of insect borne diseases is accomplished by the vector first sucking blood from an infected person or animal and later biting a susceptible individual. Infection may occur either from the insects' act of injecting salivary fluid as it bites, or by the feces,

glandular secretions, or bodily fluids of the insect being ground into the skin in the act of scratching.

7. Some of the organisms which cause insect-borne diseases must pass through a stage of development of several days in the body of the insect host before the insect is able to infect another person. Thus, there is an incubation period. This is called "biological transmission". Malaria is an example of this type of transmission.

8. The organisms of certain other diseases such as bubonic plague may be transferred to susceptible individuals without undergoing any change within the body of the insect. This is termed "mechanical transmission". There is no incubation period.

9. Many insects live parastically on animals, in which case the animals are called hosts.

OUTLINE OF CONTROL MEASURES.

Sources	Control
Cases	isolation, drugs, disinfection
Infected animals	control or destroy

Transmitting Agents

Insects	1. destroy insect in some of the stages of its life cycle. 2. prevent or inhibit breeding or continued existence of adults by modifying environmental conditions.

Susceptibles

Men.	1. Protect man from bites. 2. drug prophylaxis 3. drug treatments. 4. Hospitalization 5. Immunization

Chapter 11

MISCELLANEOUS DISEASES

The Miscellaneous Diseases to be discussed are:

Lockjaw (tetanus)

Gas gangrene

Rabies

Scabies

Ringworm "Dhobie itch" (trichophytosis)

Poison ivy, poison oak, poison sumac (plant dermatitis)

Anthrax

Infectious Jaundice

Trachoma

Scurvy

Pellagra } Diseases due insufficiency of vitamins

Beri-beri

General Remarks:

1. The organisms of tetanus and gas gangrene are to be found in animal manure, human feces, soil and street dust.
2. Rabies is a disease of mad dogs. Transmission is by the bite of the rabid (mad) dog.
3. Scabies and ringworms are transmitted by direct contact with infested persons and indirectly by use of underclothing, gloves, shoes, socks, etc., of such persons.
4. Scurvy, pellagra and beri-beri are three diseases that result from an insufficient amount of certain vitamins over a period of time.

Each disease, except those of faulty diet, shall be discussed separately below. The dietary diseases are discussed in Chapter 17, pages 102 and 103.

LOCKJAW (TETANUS)

I. General. Tetanus is commonly called "lockjaw." It is a serious disease, having a mortality which may be as high as 80 percent. It is caused by the tetanus bacillus which is an anaerobic organism (one which lives in the absence of oxygen). Tetanus bacilli enter the body by way of wounds. The size and appearance of the wound bear no relation to the severity of the illness which may develop if tetanus bacilli are present. These organisms are most apt to appear in wounds which have been contaminated with soil or road dust, especially deep puncture wounds in which foreign bodies have lodged, or wounds entering joints. These are among the common types of wounds encountered in war. The tetanus bacillus is easily destroyed by ordinary antiseptics, but, in the "spore" or resting form, it may live for a long time in the soil, withstanding wide ranges of temperature. Thus, any wound, unless superficial and clearly inflicted, must be considered a possible source of tetanus.

II. Control Measures.

A. Treatment of the wound. Any wound other than small, superficial scratches should be treated by skilled medical personnel. This is especially true of puncture wounds from nails or from spikes on athletic shoes. The treatment should be obtained promptly so that wounds may be cleaned out before tetanus bacilli gain a foothold.

B. Specific measures

1. In the past Tetanus antitoxin has been routinely administered to all cases incurring wounds in war, or under circumstances which suggest the possibility of tetanus. The dose is 1,500 units for adults and 750 units for children. It should be given as soon as possible after

the wound is incurred. It gives a fairly high degree of protection against tetanus, but has the important difficulty in use that many persons have severe reactions. These are termed serum reaction or anaphylactic shock. A medical officer can determine with reasonable certainty by a preliminary test whether antitoxin may be safely given. It is important for any person to inform the medical officer as to whether he has had asthma, hay fever, or reaction to any previous dose of antitoxin.

2. A form of vaccine called "tetanus toxoid" has been developed. This gives better protection than tetanus antitoxin, and is also safer in use. In time of war it may be given to all soldiers either at the time of enlistment or before they enter a theater of operations. Any men wounded will then be given additional injection of the toxoid as directed.

RABIES

I. General.

A. Rabies is a communicable disease of animals transmissable to man. It may occur in any animals but is most prevalent among dogs. In the dog it may occur in a furious excited form, or in a dumb and depressed form in which the animal is very weak and finally becomes paralyzed. The excited form is more common.

B. Usually the virus or organism of rabies is transmitted by inoculation of saliva through a wound or abrasion of the skin or mucous membrane. The saliva is injected into the skin by biting, but it may be transmitted by the licking of injured skin surfaces by sick animals or by handling sick animals. The

organism cannot be transmitted through unbroken skin, by ingestion of contaminated food or drink, or by contaminated fomites. While the disease occurs in cats, squirrels, rats, wolves, coyotes, foxes, horses, cattle, sheep, and swine, these animals are not common sources of infection for man. An average of 50 percent of persons bitten by a mad dog will develop rabies, unless properly treated.

II. Control Measures

A. Control of rabies depends on the prevention of the disease in dogs, treatment of wounds, and prophylactic treatment to prevent the development of the disease.

B. Dogs can be protected against rabies by specific vaccination which should be repeated each year. A metal tag giving the date the treatment was given should be attached to the collar of the dog.

C. When a case of rabies develops in a dog, or when a dog is exposed or suspected of being exposed to the infection, two doses of the vaccine should immediately be given and the animal held in quarantine for 1 month. When dogs cannot be vaccinated, those exposed or suspected of being exposed to the rabies infection should be held in quarantine for at least 6 months.

D. A person bitten by a mad dog, or by a strange and unknown dog, should report to a medical officer for treatment of the wound and a course of prophylactic vaccination. This vaccination is highly effective. If possible, the dog which bit the individual should be captured and observed to determine whether it had rabies.

SCABIES

I. General

A. Scabies, also known as seven-year itch, is an acute inflammatory condition of the skin due to the presence of the Sarcoptes scabiei or itch mite. The female is responsible for the disease, as she burrows into the skin in order to lay her eggs, while the male remains on the surface. After laying from 25 to 50 eggs, she usually dies. The eggs hatch in about 5 days. The larval and nymphal forms pass through four stages to become adults in about three weeks. The larvae also bore into the skin to find protection and food. The activity of the mites is greatly influenced by the temperature. Active burrowing takes place only when the skin is warm. The newly matured females and the males are found under the scales and crusts of the skin.

B. Scabies is an important condition because of its adverse effect on the morale and efficiency of the individual or groups. It entails an average loss of time of about 10 days in cases admitted to quarters and hospital. Complicated cases are frequently in hospitals for several weeks.

C. The source of infestation is the person with scabies. Direct body contact is the common mode of transfer, but indirect contact through clothing, blankets, or equipment may occur. Clothing from infested individuals may harbor the live parasites for at least 11 days.

D. Itchiness between the fingers and upon the back of the hands is usually the first symptom. The parts most affected are the

webs of the fingers, backs of the hands, occasionally the palms, flexor surfaces of the wrists and arms, lower part of the abdomen, the buttocks, the inner surfaces of the thighs, and the genitals. The lesions are rare upon the feet. The primary lesion is a vesicle or papule. Burrows are not found in all cases; they are most common between the fingers. They consist of straight or tortuous lines from 1/8 to 1/2 inch in length and ending in a slight elevation. Along the lines are numerous black dots, the excreta of the female. The itching is usually intense, and is especially bad at night.

E. The diagnosis should be confirmed by a medical officer, but company commanders should be able to recognize the condition. A positive diagnosis can be made by finding the mites in the burrows. A hand lens is an aid in this search. The location of the lesions on the hands, wrists, elbows, knees, and genitals aids in differentiating scabies from the scratch marks due to body lice.

II. Control Measures

A. General. A medical officer should supervise the disinfestation of a group of individuals having scabies. Hospitalization is not essential except for single or scattered cases. Eradication of existing infestation depends on proper diagnosis, disinfestation of skin, clothing, and blankets. The spread of scabies from infested recruits or isolated cases is controlled by securing body cleanliness, cleanliness of clothing and blankets, and by preventing overcrowding.

B. Special measures. Group quarantine should be established for all patients until treatment is completed. Men who have received treatment should be re-inspected 10 days after completion

of the treatment to be sure all infestation is destroyed. The clothing and blankets of men having scabies should be disinfested by the method employed for delousing. This should include gloves and shoes.

C. Disinfestation of the skin. Disinfestation of the skin is accomplished only by treatment that destroys all forms of the parasite. Bathing with hot water and free use of green soap well scrubbed in for 10 or 15 minutes is essential to remove the crusts and scales. The soap is then removed with hot water and the body thoroughly dried. Sulphur ointment is then thoroughly applied to the entire body, from the neck to the tips of the fingers and toes. It should be well rubbed in. This treatment is repeated on each of the following 2 days. On the fourth day a cleansing bath concludes the treatment. All clothes, blankets, and equipment used during the period of treatment are then disinfested. Individuals should be carefully inspected about 1 week following treatment. Itching may continue for several days after treatment, even in successfully treated cases.

"RINGWORM," "DHOBIE ITCH" (TRICHOPHYTOSIS)

I. General. The terms trichophytosis" or "ringworm" comprise a group of skin infections due to parasitic fungi. Numerous different fungi may be responsible for these infections, and all parts of the human body may be involved. All of these infections tend to become chronic, and all thrive in warm weather or under other conditions which result in prespiration. They are very common in all walks of life. They may be so mild as to be barely noticeable, or so severe as to be completely

disabling.

A. Types of Ringworm:

1. Ringworm of the scalp.

2. Ringworm of the beard.

3. Ringworm of the body.

4. "Dhobie itch" attacks the skin about the genitals, and may attack other regions of the body.

5. Ringworm of the extremities.

a. Ringworm of the extremities is variously called "dermatomycosis," "epidermophytosis", "trichophytosis", and "athlete's foot". It consists chiefly of an inflammation of the skin between the toes and on the soles of the feet, but it may also occur on the hands. The lesions may appear in various forms, including thickening and scaling of the skin, excoriation of inflamed areas, fissures, and vesicles (blisters). Usually there is considerable itching. The infection tends to recur when the feet perspire, even after lengthy treatment. Complete cures are very difficult to obtain.

b. Ringworm of the extremities is one of the most prevalent of all skin diseases, although many cases may pass undiagnosed unless their presence is revealed as the result of examination. The presence of this condition in an organization has an adverse effect on the morale of the troops. The infection, if untreated, may become so severe as to incapacitate the individual.

c. The causal agents of ringworm of the extremities are most commonly spread by contact of the bare feet with the floors, mats, benches, and chairs in the bath rooms of gymnasiums, clubs, and swimming pools. Towels, slippers, shoes, or other articles worn next to the skin may also transmit the fungi. The fungi may persist for a long time in or on these various objects.

II. Control Measures.

A. General. The control measures for all the forms of ringworm infection are essentially the same. The main objective is to prevent the bare skins of non-infected individuals coming in contact with any objects which may have been contaminated by infected persons.

B. Treatment. All cases of trichophytosis should be promptly and adequately treated. Hospitalization is not necessary in all cases, but treatment should be administered under the close supervision of a medical officer. Self-treatment will often aggravate rather than improve the infection. The feet of all men should be carefully inspected at the regular monthly inspection and at other foot inspections. All cases of trichophytosis should be promptly reported for treatment. If numerous cases are found, careful inspection should be made to determine whether there has been some slip in sanitary precautions.

C. Care of the feet. Proper care of the feet is particularly important in the prevention and control of trichophytosis. It is especially important to keep the feet dry. Men should be instructed to dry carefully the areas between the toes before

putting on socks and shoes after a bath. If the feet tend to perspire excessively, the issue foot powder should be applied twice daily. Formaldehyde or other drying solutions should not be applied to the feet unless advised by a medical officer.

D. Foot baths. If ringworm of the extremities is prevalent in a command, all bathhouses should be equipped with foot baths. The tubs should be located at the entrances to the showers and should be broad enough so that all individuals will have to step in them going to and from the showers. They should be at least 6 inches deep, and should be constructed of concrete or rubber. They should contain a solution of a grade A calcium hypochlorite in the proportion of 1 ounce of the dry chemical to each gallon of water. This yields 0.5 percent of available chlorine. A fresh solution should be prepared daily. The reason for these baths should be carefully explained to all members of the command.

E. Disinfection. The most effective control measure is disinfection of bathhouse floors and equipment, and by the disinfection of towels, swimming or gymnasium suits, and similar articles. Bathhouse floors and equipment, including mats, benches, and chairs, should be scrubbed daily with soap and water. It is also advisable to scrub them with a disinfectant such as 2% cresol, or a solution of calcium hypochlorite, 1 ounce to the gallon of water. There should be removable duckboards in shower baths. These should be thoroughly scrubbed and then exposed to the sunlight for several hours each day. Individual slippers of rubber are useful in preventing contact of the bare feet with infected surfaces. The exchange or common use of towels, gymnasium suits, slippers, shoes, or gloves should be avoided

unless they have been thoroughly disinfected after use. All articles that will not be damaged by boiling should be sterilized in that manner. Leather and rubber goods can be disinfected with a cresol solution. Shoes can be disinfected by a 1% solution of thymol in gasoline (without lead) or alcohol. This solution is poured into the shoes and allowed to evaporate.

F. Swimming pools. Swimming pools constitute a potent means for transmission of fungi unless properly operated. Regulations should be drafted for swimming pools providing for:

1. Restriction on the number of bathers to be allowed in the pool at any one time, and also between periods of cleaning of the pool.
2. A thorough bath with soap and water before entering the pool.
3. Continuous disinfection of the pool, preferably with a chlorine solution.
4. Foot baths of calcium hypochlorite before entering the pool.
5. Exclusion of those who are ill.

POISON IVY, POISON OAK, POISON SUMAC (PLANT DERMATITIS)

I. General

A. The poison ivy, poison oak, and poison sumac are the common plants that produce skin irritation in susceptible persons. The poison ivy is distinguished from other suspected creepers of a similar appearance by its possession of three leaves instead of five. The poison oak which grows especially in the western part of the United States is a shrub or small tree. The poison sumac also known as poison elder or dogwood, is a shrub or small tree

growing in swampy places.

B. The harmful part of these plants is the resinous sap which exudes from all injured surfaces. It is now certain that the poison is not volatile as was once supposed. Actual contact with the sap is necessary; however, contact with the plant may not be essential as the sap can be carried on clothing, tools, and hands, or transmitted on the bodies of insects or in the smoke coming from fires burning the plants. Sap particles carried in any of these ways soon lose their toxic properties by oxidation. This loss is more rapid at body temperature and in a moist atmosphere. The poison is soluble in alcohol and alkalies.

C. The clinical manifestations appear within a few hours after exposure and within 24 hours there is a marked cutaneous irritation. The lesions are most marked on the back of the hands and forearms; the face is usually involved, either primarily or secondarily. In men the penis is often involved, due to the poison being conveyed by the hands. At first there is a marked erythema with some swelling, but in a short time, numerous tiny vesicles appear. These may coalesce to form large vesicles. Often they are in rows, due to scratching. Within 2 to 4 days, the lesions rupture leaving a weeping raw surface which goes on to form a dry crust. As the vesicles are superficial, complications seldom occur and the patient is usually well in 2 weeks. The subjective symptoms are generally severe, with intense burning and itching and a feeling of increased tension of the skin.

II. Control Measures.

A. General measures. Learn to recognize the plants and avoid them when possible. Destroy the plants in occupied areas. Avoid

contamination in camps by requiring all men working in or about the plants to —

1. Wear gloves while at work
2. Change outer clothing and gloves before associating with the other men in the camp.
3. Keep contaminated tools and implements separate
4. Burn poisonous vegetation at a considerable distance from the camp site and always at such time and place that the wind will carry the smoke away from the camp.
5. If possible, choose camp sites where poisonous plants are not present.

B. Personal measures

1. Contaminated clothing and implements should be well washed with water (soda water if possible) or exposed to the direct rays of the sun for several days.
2. All parts of the body that have been exposed to the plants should be well washed with a strong soap solution or alcohol. Gasoline or (without lead) kerosene may be used. The washing must be prompt and thorough, or else it will tend to spread the poison.
3. Skilled medical treatment should be promptly sought if the skin eruption appears.

GAS GANGRENE

I. General. Gas gangrene is an acute infection occurring in large, crushed wounds contaminated with human or animal wastes found in soil. The infection is usually associated with compound fractures and large wounds that come in contact with the soil, but it has occasionally followed puncture wounds. Once the disease develops it is extremely difficult to control. The mortality is very high.

II. Control Measures: Control depends on early and proper surgical treatment and the use of sera. The first aid precautions are the same as those for tetanus.

PART II

THE SOURCES OF INFECTION AND THEIR CONTROL

Chapter 12.

THE SOURCES OF INFECTION: THEIR CONTROL

The sources of infection, as has been stated are:

case
carrier
infected animal

Before the control measures are discussed, it is necessary to define several words.

CONTACT - A person who has been closely associated with a sick person is known as a contact.

SUSPECT - A person who has been exposed to a communicable disease and is ill, but in whom the symptoms and signs present are insufficient to warrant a diagnosis of the particular disease, is spoken of as a suspect.

Control measures have as their objective the removal of the source of infection from susceptibles.

The control measures are carried out by:

1. ISOLATION - Cases of communicable diseases are hospitalized if possible, and are kept separate from other persons. This is termed "isolation". Cases, carriers or suspects may be placed in isolation for treatment and observation.

2. QUARANTINE - Quarantine is the separation of a group containing individuals who are actual or potential sources of infection from the remainder of the command for the purpose of preventing the transmission of the infection.

   Group quarantine is the restriction of a contact group under conditions which will prevent the spread of the infection to unexposed members of the command, but will permit the group as a whole to continue training. The group may be a squad, platoon,

or even a company.

3. DISINFECTION - is another method of preventing the spread of pathogenic organisms. It is accomplished by steam, chemicals, sunning, or airing.

   a. Concurrent Disinfection

      (1) In respiratory diseases it involves the disinfection of such fomites as: wash basins, thermometers, bed pans, urinals.

         (a) Paper napkins, kleenex and similar articles should be burned.

         (b) Those attending the patient should wash their hands with hot soapy water after each contact with the patient.

         (c) A gown should be worn by attendants as a means of protection.

         (d) Dishes, see "e" below.

      (2) In intestinal diseases, it involves burning or disinfecting articles soiled by excreta.

         (a) Discharges can be disinfected by adding 2% cresol solution, or 10% formaldehyde and allowing the mixture to stand at least 1 hour.

         (b) The volume of disinfectant used should be twice that of the material to be disinfected.

         (c) Urine - Add sufficient cresol to make an approximate 2% solution. Mercuric chloride 1:1000 may be used in place of cresol.

         (d) Uneaten food - Burn or dispose in such a manner that it cannot be a source of bacteria.

(e) Dishes and eating utensils should be boiled after use, for a period of at least 1 minute. Dishes immersed in water at temperature of 160° F for one minute will destroy pathogenic organisms. But, under practical working conditions, dishes cannot be sterilized by heat in the sense that all organisms are destroyed. Because of the difficulties encountered, considerable attention is now being given to the use of chlorine for this purpose. After the dishes have been cleaned by washing and rinsing in hot water to remove the soap, they are immersed for not less than 2 minutes in a fresh chlorine solution of this proportion: one ounce of calcium hypochlorite to every 25 gallons of water. Rinse water should be 180° F, and not fall below 170° F at any time during the rinsing period.

(f) Sheets, towels, pajamas, etc. - Boil or immerse in a 2 or 3% solution of cresol.

(g) Those attending the patient should care for their hands as explained above.

(h) Attendants should wear gowns.

4. Those diseases that can be treated by means of specific drugs are so treated. Such treatment is a means of reducing the potential dangers of a case.

a. Terminal infection - When the patient recovers and leaves the hospital, his room and the articles he used should be disinfected.

(1) In certain diseases only bedsteads, floors and walls must

be thoroughly scrubbed with soap and water immediately after the patient using it has been transferred. Blankets and mattresses are aired or sunned in some instances, in others they are steamed.

(2) Amebic cysts are destroyed by a 2% to 5% solution of cresol. The shorter time the patient is ill, the shorter time will he be a source.

5. Lastly, cattle may be destroyed in certain instances. Such an instance would be tuberculosis.

Fig. 2. Diagram to show how pathogenic organisms can get into food. Methods of fighting these hazards are designated by blocked numbers (1) to (8.) See page 96 for detailed explanation

= pathogenic organisms.

PART III

THE TRANSMITTING AGENTS: DETAIL AND APPLICATION

Chapter 13.

TRANSMITTING AGENTS: GENERAL REMARKS

As stated in Chapter 5, the transmitting agents are:

1. Food
2. Water
3. Contact
4. Insects

The next five chapters go into the details of the manner by which these agents transmit disease. To understand the facts of transmission is one thing; to understand the principles of the control measures is equally important. Control measures are merely the methods of preventing the development or an increase in the spread of communicable disease.

Water is used to fight fires. This statement is not made with the idea of teaching you something new. It is made, however, to point out that water is a control measure to be used in preventing the spread of fire.

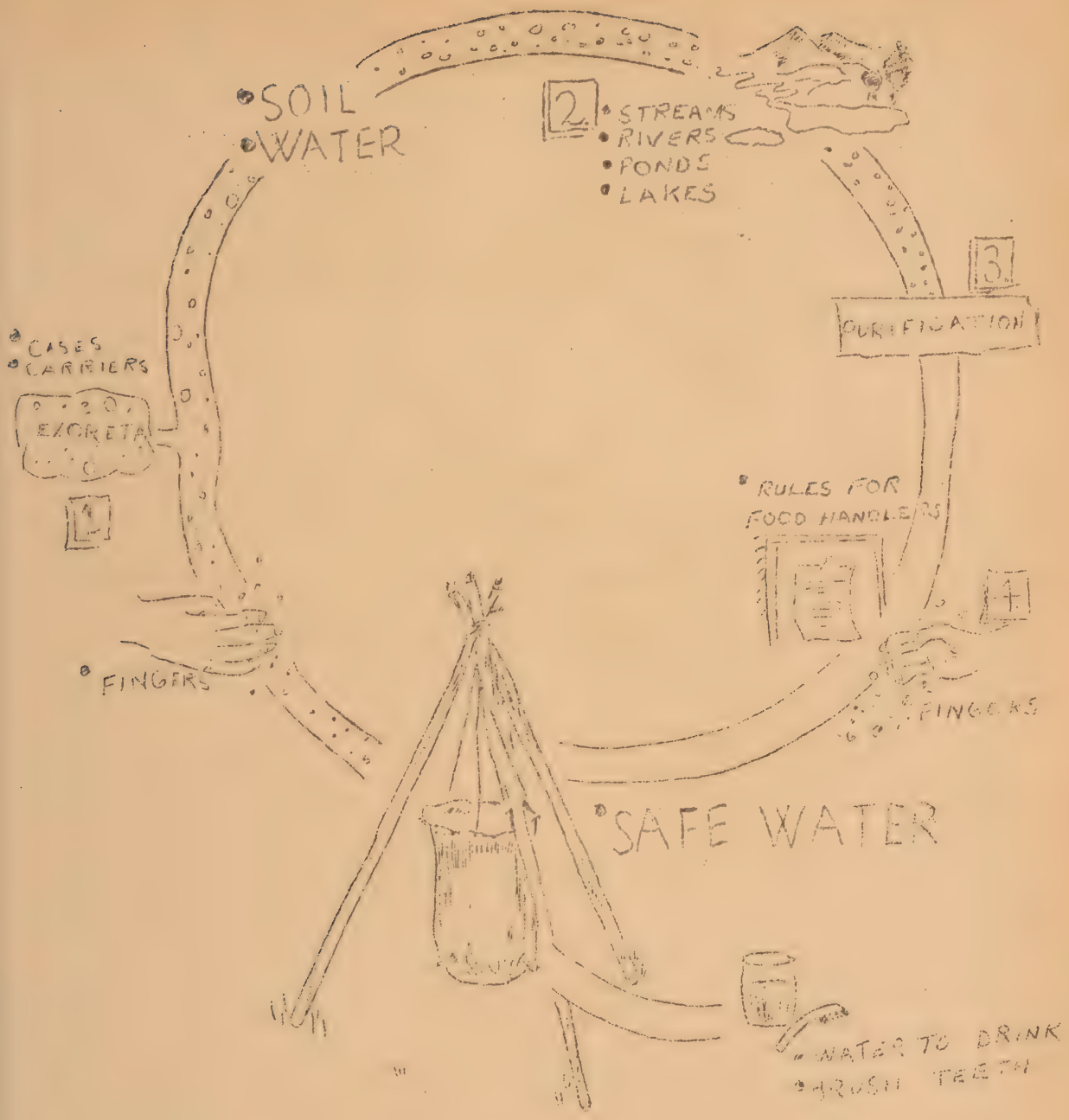


Figure 3. Diagram to show how pathogenic organisms can get into water, Methods of "fighting" these hazards are designated by blocked numbers as [2.] (Start at [1], See page 90 for detailed explanation. ° ° ° = pathogenic organisms.

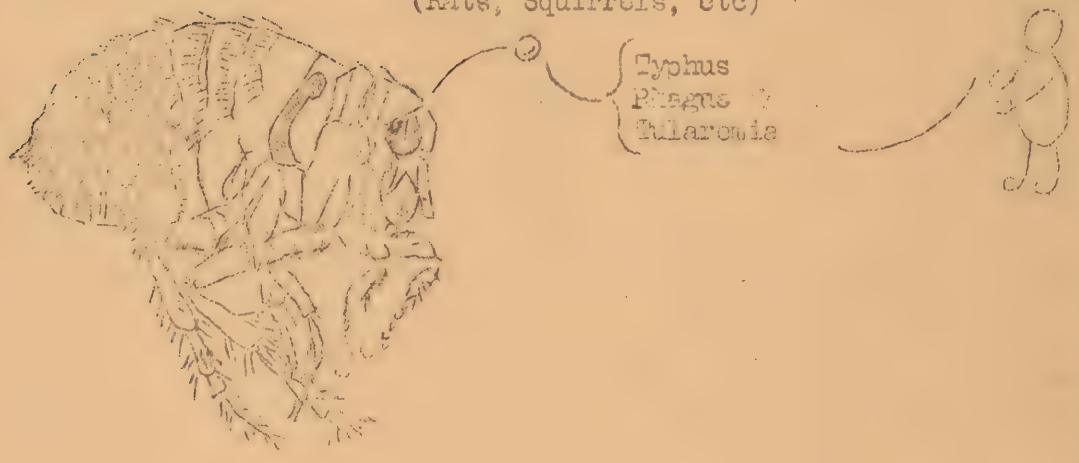
TRANSMITTING AGENT SOURCE DISEASES SUSCEPTIBLE

Mosquito

Cases
Infected Animal

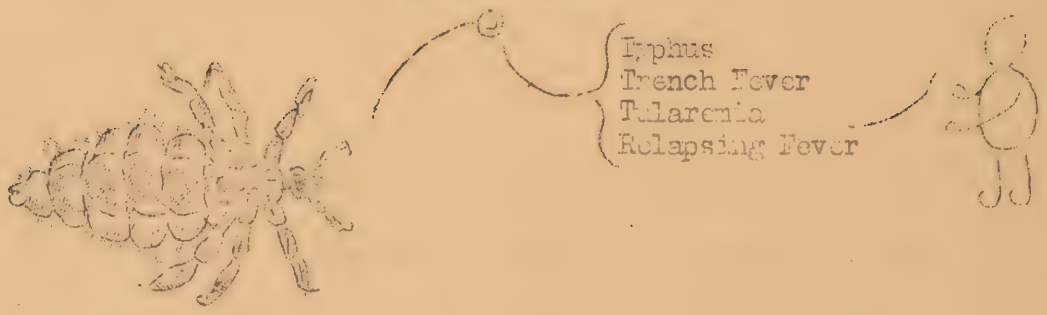
Flea

Case
Certain Rodents
(Rats, Squirrels, etc)



Louse

Case
Infected Animal



TRANSMITTING AGENT SOURCE DISEASES SUSCEPTIBLE

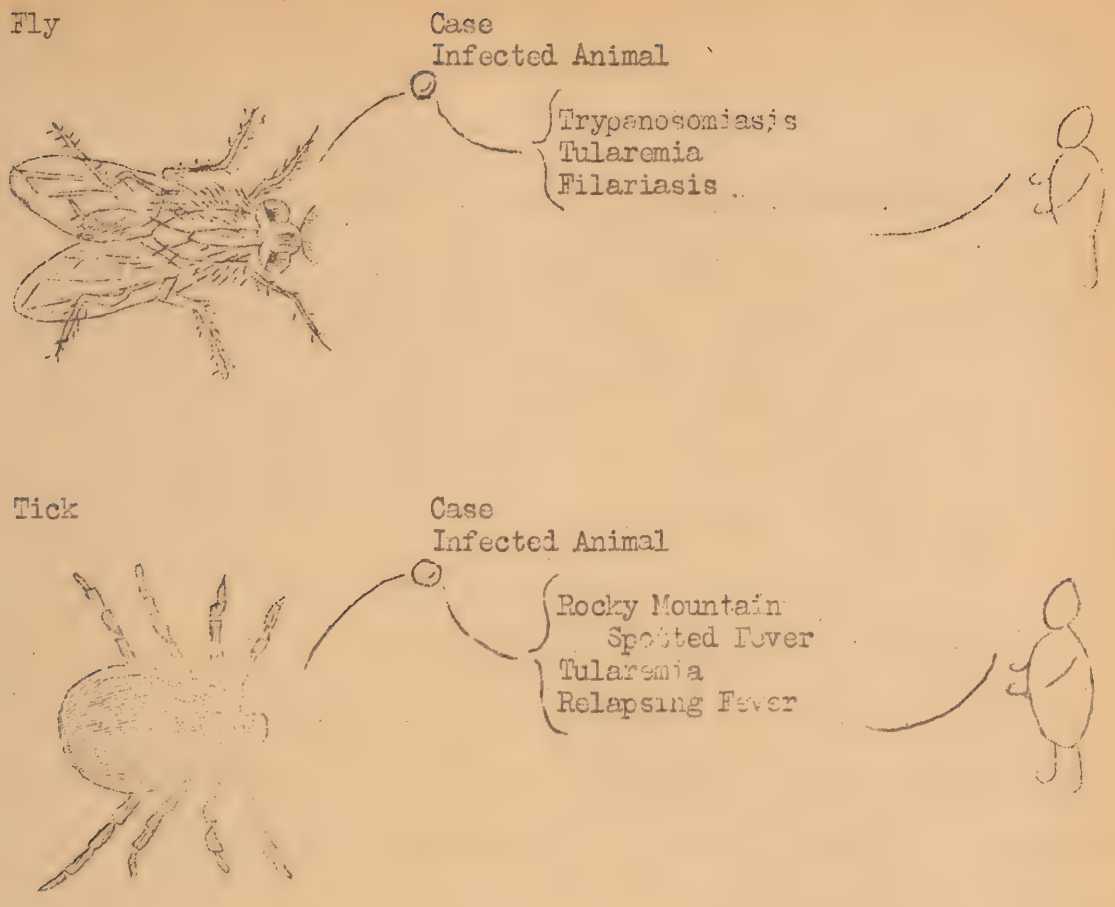


Figure 4 -- Diagram to show how insect-borne diseases are transmitted.

The above diagrams are a fairly precise means of calling y r attention to the essential factors which are of importance in the transmission of respiratory diseases, intestinal diseases and insect-borne diseases.

The following chapters of Section II, shall deal specifically with the following subjects:

1. Air Control
2. Water Control
3. Food Control
4. Insect Control
5. Rodent Control

Section IV of this shall discuss measures to maintain health, many of which measures are matters of personal hygiene.

After a study of Section III, you are in a position to logically understand the meaning, purpose and principles of disease prevention (control). For instance, turn to page 44. There you can find an outline of control measures for respiratory diseases. It requires an understanding of air control, food control, of measures to maintain health and of personal hygiene. Thus, a complex subject has been simplified as much as possible. This book can serve you two purposes in the future, should you wish to refer to it. First, the brief chapters on the groups of Diseases (Chapter 7 through Chapter 10) present important facts and an outline of control measures. Secondly, Section III presents the various control measures in considerable detail. Some of these details are what you might call facts of a practicable value that are a value to yourself. Other facts, difficult and unnecessary to learn, but none the less valuable, are available to those who make the effort to search them out.

CHAPTER 14

CONTROL OF VENEREAL DISEASES

Control Measures

A. Responsibility. The venereal disease rate of an organization is usually a rather close index of the state of discipline, training, and administration of that organization. The responsibility for venereal disease control rests primarily on unit commanders. The principles of transmission of venereal disease are simple and are easily understood by all persons.

B. Preventions of exposure. The most important fact to be kept in mind by all individuals is that almost all women who will permit promiscuous sexual intercourse are infected with venereal disease. Sexual intercourse is not essential to health, and efforts should be directed toward preventing exposure to infection.

C. Prophylactic measures. In spite of warning, many individuals will expose themselves to infection. Mechanical and chemical means of preventing the development of infection give a fairly high degree of protection, but only so when promptly, intelligently, and thoroughly applied.

1. Mechanical The condom affords the only practical mechanical protection against venereal infection. Post exchanges are required to stock condoms of approved quality. A condom will prevent gonorrheal infection, which must enter the urethra. It is not certain protection against syphilis, chancroid, or lymphogranuloma inguinale, which may enter the skin and tissues about the genitals. Con-

sequently, chemical prophylaxis must be given even after a condom has been used.

2. Chemical

a. Prophylactic stations - The Medical Department is responsible for operating sufficient prophylactic stations to serve adequately each command. In many situations it is advisable to establish such stations in civilian communities adjacent to Army stations or camps. Prophylactic stations may be established even in bivouacs. Chemcial prophylactic treatment is given in these stations by trained enlisted men of the Medical Department. Any soldier may apply for treatment regardless of the hour. The chemical prophylaxis given is highly effective if administered within 30 to 60 minutes of the time of exposure. Its effectiveness decreases rapidly after that time. The attendant at the station gives each soldier a signed record of the treatment, showing the date, hour, and place of treatment. This treatment cannot be satisfactorily administered to a man who is drunk because individual cooperation is necessary.

b. Prophylactic equipment. The following equipment is necessary for a prophylactic station:

(1) Protargol soltuion, 2 percent, freshly prepared weekly. Keep in amber-colored bottles.

(2) Bichloride of mercury solution, 1-1,000. Poisonous. Does not deteriorate.

(3) Sufficient calomel ointment, 30 percent. Well mixed. Does not deteriorate.

(4) Sufficient liquid soap in a bottle with a shaker top made by inserting a glass tube through the cork.

(5) At least 1 dozen serviceable urethral syringes. Keep in a closed jar.

(6) Tongue depressors. Keep in a closed container. To be used to remove the calomel ointment from the jar.

(7) Sterilizer for syringes. They must be washed thoroughly in soap and water, then sterilized by boiling for 5 minutes.

(8) Sponge holder, to be used by soldiers in removing syringes, tongue depressors, gauze, and sponges.

(9) Running water or at least 1 dozen wash basins.

(10) Sufficient 2-ounce medicine glasses, into which protargol is poured before use by the soldier.

(11) Clock.

(12) Roll or absorbent paper.

(13) Towels, linen or paper.

(14) Large, easily read labels for everything the soldier is required to use.

(15) Well lighted room, preferably with an anteroom as a waiting room, and a small adjoining room or booths with either a large trough with running water or individual porcelain troughs in each booth.

(16) Sufficient blank forms W.D., M.D. No. 77 (Venereal Prophylaxis Slip) to be made out properly and kept on file for at least 3 months. When the soldier receiving prophylaxis is from another organization, send a duplicate copy of W.D. M.D. Form No. 77 to his commanding officer next day.

(17) Place to wash hands.

c. Prophylactic procedure - The prophylaxis must be given by a trained attendant. Some of the steps in the prophylaxis may be self-administered but they should be closely supervised the attendant.

(1) Examine penis for signs of venereal disease. If any sign of venereal disease is seen, do not administer prophylaxis until soldier is seen by a medical officer.

(2) Have soldier urinate and wash his hands

(3) Have soldier wash penis, scrotum and adjacent area of his body thoroughly with liquid soap and warm water. Flush off with 1-1,000 bichloride of mercury solution.

(4) By means of a syringe inject a teaspoonful of 2 percent protargol into penis. Have soldier close the opening with his thumb and finger and retain the solution for 5 minutes by the clock. Too much pressure must not be placed at the end of the penis. This is where the germs, if present, are likely to be most numerous. Release pressure very slightly at intervals to allow for thorough bathing of end of opening.

(5) Have soldier pull back the foreskin; thoroughly rub into the penis and surrounding body area about a teaspoonful of calomel ointment, 30 percent. Rub in for at least 3 minutes. Wrap penis in a towel or paper. Instruct the soldier not to urinate for at least 4 hours, if possible.

3. Emergency. If a soldier has exposed himself and has neither a prophylactic tube nor access to a station, he should empty his bladder, and then scrub his genitals and the surrounding skin area with soap and water. This may serve to prevent infection.

D. Punitive measures

1. Any individual who knows or believes that he has contracted a venereal disease must report that fact to his immediate commanding officer without delay. Trial by court martial or other disciplinary action for concealing a venereal disease is discretionary with the commanding officer. No disciplinary action is authorized for failure to take prophylaxis or for having contracted a venereal disease.

2. Any person in the military service who loses time from duty because of a venereal disease forfeits his pay during the time he lost and must make good the time lost.

E. Physical inspections. The periodical physical inspections which are conducted at least once each month for all enlisted men below the first three grades include inspection for evidence of venereal disease. Additional inspections may be arranged if it is believed that some men may be concealing venereal disease. These are most effective if conducted early in the morning or just after return from outdoor activity.

F. Treatment All cases of venereal disease should be promptly sent to the hospital or dispensary for treatment. Early treatment ofte far better chances of cure than does delayed treatment. Self-treatment and treatment by unskilled individuals are both ineffective and dangerous.

CHAPTER 15

AIR AND ITS CONTROL

It goes without saying that air is essential to us. On the other hand air can play a part in the transmission of disease.

I. Air, General Remarks:

A. A mixture of:

1. Oxygen..... .....21.00%
2. Nitrogen.....78.00%
3. Carbon dioxide..... .. ....0.03%
4. Other gases..... .0.97%
5. Varying amount of water vapor.
6. Particles of
   a. Dust
   b. Bacteria
   c. Yeasts, etc.

B. Air affects the physiological functions of the body by:

1. The interchange of gases in breathing.
2. The regulation of body temperature.

C. The Chief Physical Properties of Air:

1. Temperature.
2. Humidity
3. Movement of air.
4. Atmospheric pressure.

When a person sneezes, coughs, or even talks a fine spray of moisture leaves the nose or mouth. This spray can be likened to the spray of water from a garden hose. On these particles of water are numerous germs. Even well people have innumerable bacteria in their mouths. People with respiratory diseases spread (droplet infection) great numbers of germs when they sneeze, cough, talk, or spit.

It is to our advantage to prevent the spread of respiratory diseases. Therefore the object of control is to prevent crowding and the consequent close contact between infected persons and susceptibles.

Control of transmission of bacteria by air:

1. Prevention of overcrowding by:
   a. Proper bed spacing: The heads of individuals in adjacent beds should be as far apart as possible — at least five feet.
   b. Head to foot bed arrangement: When the distance between the heads of individuals is less than 5 feet, the beds should be so arranged that the head of one man is opposite the feet of the man in the adjacent bed.
   c. Or a cubicle screen: can be used to protect the heads of each individual. Screens, sheets or shelter halves make serviceable cubicles.
   d. Staggering of beds is still another method.
2. Proper ventilation
   a. A lack of ventilation leads to the accumulation of so called "dead air". It lacks freshness. It becomes warm. Bacteria accumulate. Body odors become noticeable.
   b. Ventilation is usually obtained by opening windows at the bottom on the windward side and at the top on the other side. Tents are ventilated by rolling up the sides daily, weather permitting.
3. Cleanliness of barracks.
   a. Spitting on the floor (droplet spray), dry sweeping of the floors, careless coughing, and sneezing can lead to the transmission of disease. They are best controlled

--by prohibiting them.

b. Cuspidors, containing a 2% solution of cresol to a depth of one to two inches, should be available. They must be cleaned daily .

4. Sunlight.

a. Windows provide sunlight, which has an antibacterial effect.

THE SECOND REASON FOR CONTROLLING AIR: COMFORT

To be cold or "too warm" or"loggy" is to be uncomfortable. Our bodies are constantly giving off heat. If the environment is so warm that it cannot take up the heat given off by the body- why then the body becomes uncomfortable. In an effort to become comfortable, sweating takes place which, on evaporation, cools the warm skin. Were the environment less warm, the body would not be forced to sweat.

If on the other hand the environment is too cool, the body becomes cool in an effort to save heat. The blood vessels contract, the temperature of the body falls; there may be shivering. Certainly there is discomfort.

Bodily comfort is under the automatic control of the heat regulating center in the brain. We are unable to alter its method of functioning; we can however, adjust our environment. The environment can not be altered, unless weknow these facts:

I. Heat is lost from body by:

A. Radiation.

1. Like a radiator. Heat leaves warm skin and goes to cooler clothes.

B. Convection

1. The carrying away of the heat lost by radiation. If you

near the door of a furnace the air carries the heat from the hot coals to your body, which feels the warmth, just as the air carries the heat that comes from the surface of a hot poker.

C. Evaporation.

1. Heat is lost by evaporation of perspiration, the process of evaporation abstracting the heat from the body with consequent cooling.

D. Respiration.

Example - When one becomes overheated the heat regulating center goes into action, sending the hot blood to the surface of the body where some of the excess heat is radiated and conveyed away; and perspiration, and respiration are accelerated. The relation of these physiological functions to the physical properties of the air, temperature, humidity, and movement will not be discussed.

II. Effect of the Physical properties of Air on Bodily Comfort.

A. Temperature.

1. Temperature influences convection and evaporation.
2. Poor ventilation and overcrowding cause poor radiation of heat from the body and rise of temperature.
3. Discomfort increases as the room temperature approximates that of the body, preventing as it does loss of heat by radiation.

B. Humidity.

1. Influences output of heat from body by:
   a. Increasing the conductivity of the atmosphere for heat- (a cooling influence) and hence cold moist air is

chilling.

b. Interfering with the evaporation of perspiration (a heating influence) and hence warm moist air is enervating.

2. At a temperature of about 68° F. humidity has comparatively little effect.

3. Definitions.

a. Relative humidity

(1) The amount of moisture in the air.

4. Relative humidity affects the body by:

a. Controlling the rate of evaporation of perspiration.

b. The greater the relative humidity (the more moisture in the air)

(1) The less moisture the air can absorb

(2) And hence the slower will be the evaporation of perspiration.

c. On hot " humid " days there is a high relative humidity, though not necessarily a high temperature. The drying power is poor because of the high percentage of moisture in the air.

d. On "dry" days there is a low relative humidity (desert, moutain regions) and one can stand high temperature without distress. The drying power is high because the air can take up a great deal of moisture.

e. In cold weather.

(1) The greater the relative humidity the more one will mind the cold, the moisture in this case acting as a rapid conductor of heat away from the body.

C. Movement of Air.

1. Has an effect on bodily comfort by influencing convection

and evaporation.

a. A layer of hot moist air collects in the meshes of the clothing about the body. The moving air blows this away and mixes it with the air in the room, thus cooling and relieving the body.

b. Movement of air associated with minute changes in temperature has a distinct stimulating effect. This explains the comfort produced by an oscillating fan.

c. Hence, bodily comfort can be achieved within certain limits by adjusting our environment - air temperature, and air movement (draft).

Chapter 16

WATER AND ITS CONTROL

All sources of water in the field must be considered as contaminated and should be properly treated before use. Surface water (ponds, rivers, or small streams) is generally more heavily contaminated than ground water (wells or springs).

Contamination of water, when it occurs, is caused chiefly by sewage from cesspools, latrines and drains.

The soil is self-purifying; if it were not, the human race would have died out long ago. All water, except rain water caught in cisterns, passes over or through the soil layer of the earth.

Certain pathogenic organisms remain alive for long periods of time in the soil by changing themselves to highly resistant spores and cause what are known as the "soil" diseases: tetanus, gas gangrene, botulism, anthrax.

The most frequent and dangerous form of soil pollution, however, is that caused by the human intestinal and urinary wastes, causing typhoid and paratyphoid fever; bacillary and amebic dysentery; hookworm disease and infestation by round worms. These organisms can withstand adverse conditions in the soil better than others. Hence, they are not readily destroyed. They often live long enough to reach streams and rivers, thus contaimnating water supplies. It should be mentioned parenthetically that in the tropics soil pollution with fecal material is common and that the soil is moist and warm, thus providing a favorable environment for bacterial growth.

Water, safe for drinking purposes, is obtained by certain control measures. First, turn to page 74 and study the diagram which shows how

water can transmit intestinal diseases.

CONTROL MEASURES (Refer to Fig. 3, page 74)

The following are control measures:

1. Proper waste disposal (see Chapter 14), the purpose of which is to prevent pathogenic organisms of the excreta of cases or carriers from reaching the soil or any water. Besides properly constructed latrines to prevent access to flies and animals, the excreta of cases and carriers are disinfected.

2. Protection of a Water Supply by Flagging the Stream.

   A. If a stream is to be used as the source of water supply of an organization, it should be marked off in zones, indicated by markers, and water guards should be posted.

LOCATION OF WATER SOURCES (STREAM)

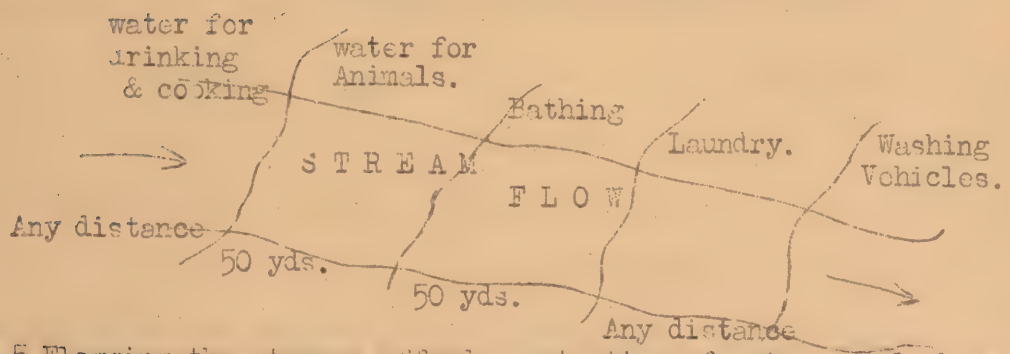


Fig. 5 Flagging the streams affords protection of water supply by proper use of stream from which water is taken for various purposes.

3. PURIFICATION

   A. Purification

   Preliminary treatment. The water selected should be as clean as possible, and the heavier organic matter removed by straining or settling. A pit dug 4 to 5 feet from the edge of a stream or pond and 3 to 4 feet

below the stream level makes a satisfactory settling basin. Another method is to remove both ends from a barrel or oil drum and sink one end into the bottom of a shallow stream or pond, dipping water from inside the barrel.

1. METHODS OF PURIFICATION

A. Boiling. Boiling is the safest method, but is undesirable because of the flat taste and because of the lack of containers for boiling other than small quantities. Five minutes of boiling is required for sterilization of water.

B. Chlorination. Chlorination is the choice method and may be carried out in the water sterilizing bag (Lister bag), in water carts, in small reservoirs, or by the purification units operated by the Corps of Engineers. The exact amount of chlorine required will vary with the characteristics of the water being treated. Water containing considerable organic matter requires considerably more chlorine than does clear water.

1. Water sterilizing bag method. The procedure is as follows:

a. Suspend the bag on a tripod. Fill it with water to the mark 4 inches from the top, straining the water through cheesecloth. The capacity is 36 gallons.

b. Draw a small quantity of water through one of the faucets into a canteen cup.

c. Break a tube of calcium hypochlorite into the canteen cup, stir with a clean stick, then fill the cup two-thirds full of water.

d. Empty this solution into the water bag and stir thoroughly with a clean stick which is long enough to reach to the bottom of the bag.

e. Draw at least one-half canteen cup of water from each of the faucets and pour it back into the water bag. This serves to sterilize the faucets.

f. Wait 30 minutes after chlorination before using the water.

g. When especially trained technical personnel and facilities are available, it may be practical to control accurately the degree of chlorination and thus provide a more acceptable water supply when judged from the point of both taste and safety. This controlled chlorination requires the use of an orthotolidine test solution and may be employed after the calcium hypochlorite is added to the water in the following manner: Wait 10 minutes, then wash out one of the faucets by allowing a small amount of water to run through onto the ground. Fill a clean canteen cup two-thirds full of water from the same faucet. Add 1 cc. (15 drops) of orthotolidine testing solution to the water in the cup. Wait 5 minutes and note the color

produced.

Below is a guide for reading the color reaction between the free chlorine and orthotolidine:

(1) No color. Insufficient chlorination. Add more calcium hypochlorite.

(2) Canary yellow. Insufficient chlorination. Add more calcium hypochlorite.

(3) Deep yellow. Satisfactory chlorination. This represents about one part per million (p.p.m.) of chlorine.

(4) Orange red. Overchlorinated. Add more water and test again.

(5) Bluish green. Alkaline or hard water. Add a few more drops of orthotolidine to get a correct color reading.

h. The cover should be kept on the bag to prevent recontamination. The unpleasant taste of chlorine is diminished by allowing chlorinated water to stand several hours before use. If for any reason orthotolidine testing solution is not available, it can be safely assumed that one tube of calcium hypochlorite will adequately chlorinate 36 gallons of water. It will never dangerously overchlorinate this amount of water.

2. Water cart method. Chlorination may be done directly in water carts, stirring in calcium hypochlorite at the rate of about one tube to each 36 gallons of water. The exact amount needed can be determined by the orthotolidine test. These carts must be thoroughly cleaned at frequent intervals.

3. Canteen Method. Fill a canteen with water and dissolve into it the contents of one tube of calcium hypochlorite, being sure that it is evenly mixed throughout. Add one canteen cap (6 cc) of this solution

to each canteen of water. Wait 30 minutes before drinking the water. This method is less accurate than chlorination in the water sterilizing bag and requires very close supervision of all individuals. The concentrated calcium hypochlorite solution may be prepared in a 1-quart bottle instead of in a canteen.

C. Use of iodine.

In the absence of calcium hypochlorite tincture of iodine may be used as a temporary expedient. Two or three drops of tincture of iodine will purify one canteenful of water. Thirty minutes should be allowed before the water is used. This method is rarely practicable in combat since all available iodine will generally be needed for treatment of wounds.

4. Cleanliness of hands is essential. It is not only the duty of food handlers but the duty of all individuals to maintain high standards of personal hygiene.

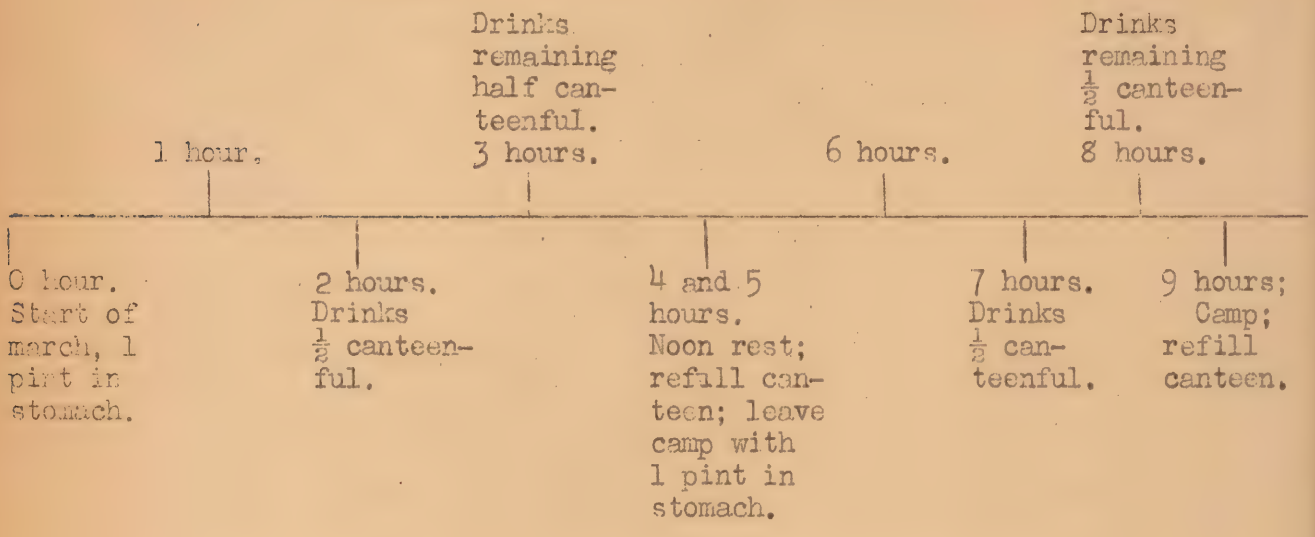
So much for water and its control. A few words should be said about water discipline.

WATER DISCIPLINE

I. Water discipline on the March.

A. In marching 1 mile, a fully equipped soldier generates 90 calories of heat which will require 180 cc. of water to dissipate. For 3 miles, or 1 hour, 540 cc. of water are required, which is a little over 1 pint (473 cc.). For 2 hours the soldiers will lose 2 pints or the equivalent of 1 canteen of water. There are too many factors entering into the water requirements to dogmatize or standardize the fluid intake too

rigidly. It is safe to assume that the soldier starts the march with about 1 pint of extra fluid in his stomach. The following diagram shows the ordinary consumption of water on a day's march:



B. Water should be chlorinated and canteens filled the night before a march is started. Chlorinated water in company cans should be available at the noon halt.

Chapter 17

FOOD AND ITS CONTROL

Food is a transmitting agent. It can carry pathogenic organisms. Contaminated food may be eaten, resulting in the development of disease. To protect ourselves against invasion of pathogenic bacteria via food, it is necessary to maintain at all times offensive and defensive measures. Defense alone will not bring success.

Satisfactory protection can be achieved. Listed below are the principle factors, each of which shall be discussed in detail:

1. Control of food products of animal origin.
2. Inspection of food when received.
3. Storage of food to protect it from flies, and animals, and to prevent deterioration.
4. Preparation of food.
5. Care of cooking and eating utensils.
6. Contamination of food during preparation and serving. Food handlers.
7. Menus and serving of food.
8. Disposal of wastes.
9. Mess inspection.

These factors are now discussed in detail.

CONTROL OF FOOD PRODUCTS OF ANIMAL ORIGIN

Even before food of animal origin (meat, meat products, poultry, eggs, fish and other seafoods, as well as all dairy products) is purchased, it is inspected by various civil and military inspecting agencies (Veterinary Corps) with one purpose in mind. The purpose

of inspection is to protect the health of troops. Any food, deteriorated or contaminated, is rejected for use in organizational messes.

A. The meat of a healthy animal is free from bacteria -- all bacterial decomposition is due to contamination, subsequent to slaughter. Since it is impossible to prevent handling entirely, it can be said that all fresh meat is more or less contaminated with bacteria or fungi. Under unsanitary conditions the meat may be contaminated with pathogenic organisms.

Non-pathogenic bacteria after invading meat cause decomposition. This process of deterioration can be retarded by placing the meat in regrigerators which insure low temperatures which are not conducive to rapid bacterial growth.

Meat properly handled prior to receipt usually remains free from decomposition for 6 - 10 days if immediately placed in a temperature of about 35° F. The average refrigerator maintains a temperature of from 45° F. to 55° F. and is not satisfactory as a storage for more than 72 hours.

Meats most frequently transmit typhoid fever, food infections, dysenteries, diarrheas. In addition tuberculosis, scarlet fever, and diphtheria may be carried. Finally meat, especially sausage, may carry the toxin of botulism.

B. Poultry and eggs. Evidence of decomposition, slimy or sour carcasses, or any other unsoundness render the carcass unfit for food. The diseases common to poultry are not readily communicable to man.

Eggs are inspected for freshness, soundness, cleanliness of shell, color and size. Unsoundness, a cause for rejection, is indicated by: mixing of the white and yolk, blood rings, abnormally colored yolks, movable air cells, discolored whites, or foreign bodies. Candling and breaking a considerable proportion of an entire lot are the means of testing for freshness and soundness.

C. Fish and Sea Foods. Details of inspection will be omitted. It is perhaps worth while to mention several facts of interest. (1) The flesh of fish may contain chemical poisons which produce illness in man - most of the fish so affected are found in the tropics. The poison is usually found in the ovaries, eggs, head and liver of the fish. Boiling does not destroy or remove the toxin. (2) Some fresh water fish (pike, perch) may contain the encysted larvae of the fish tapeworm. Thorough cooking will destroy the larvae; while smoking, drying, salting, or freezing will not destroy the larvae.

D. Milk and Milk Products. All bovines on the dairy farm should be free from disease as shown by a thorough examination conducted by a qualified veterinarian. Barns should be ventilated to allow fresh air to displace old air. Manure should be removed and so disposed of as to prevent fly breeding. Milking material should be sterilized. Milk must be promptly cooled within 1 hour after milking to 50° F. and maintained at or below this temperature until delivered to the pasteurizing plant. All personnel concerned with milking or the handling of milk should be familiar with the necessity of strictest sanitary precautions (avoid droplet infection of milk; clean hands, etc.) and be required

to undergo careful periodical physical examination to assure freedom from contagious or communicable diseases.

Pasteurization is the heating of all particles of milk, or milk products to a temperature of not less than 143½° F. and holding at such temperature for not less than 30 minutes in approved pasteurization apparatus.

Milk to be sanitary must necessarily be obtained from healthy cows and produced and handled under hygienic conditions even when it is pasteurized. Cleanliness throughout is essential. All milk bottles must be sterilized immediately before being used. There must be safe water and steam for cleansing and disinfecting purposes. Screens (to keep out flies) should be employed in those places where they serve a useful sanitary purpose.

Milk may transmit the following diseases: typhoid fever, common diarrhea, undulant fever, septic sore throat, diphtheria, scarlet fever, and tuberculosis.

Milk products are: cheese, butter, ice cream.

INSPECTION OF FOOD WHEN RECEIVED

All food received at a mess should be inspected by the mess sergeant, the mess officer, or the commanding officer of the organization. The purpose of this inspection is to determine if the food is of proper quality and free from contamination.

STORAGE OF FOOD

Food is stored for two purposes: (1) to prevent deterioration; (2) to protect from dust, dirt, insects, and animals.

A. Perishable foods should be kept at suitable temperatures to prevent deterioration.

B. Meats are kept in refrigerators in permanent posts, while vegetables are afforded protection by vegetable bins. Bread boxes or storage cabinets should be well ventilated but screened to prevent the access of flies to the food.

C. In the field, food is usually placed in containers which are suspended from trees, immersed in water, or placed underground.

PREPARATION OF FOOD

Thorough cooking and immediate serving after cooking are the best safeguards against the transmission of communicable diseases by food, provided care is taken not to contaminate the food after cooking.

Thorough cooking destroys the cysts of: the beef tapeworm, the pork tapeworm, the fish tapeworm, and trichinella (causes trichinosis).

All vegetables that are to be eaten raw, and which cannot be peeled, should be thoroughly washed in running water before serving. This applies especially to lettuce greens and radishes which may become contaminated with pathogenic organisms from materials used as fertilizers, especially in the tropics (amebae of dysentery, pin worms, etc.)

CARE OF EATING AND COOKING UTENSILS

A. All eating and cooking utensils should be sterilized immediately after use by washing in hot soapy water, followed by rinsing in hot clear water. This is necessary to destroy pathogenic organisms. The utensils should then be dried by the air. Dish towels should never be used. When not in use all utensils should be protected from dust and flies (carry bacteria).

Dishes which are immersed in water at a temperature of 160°F. for one minute will destroy all pathogenic organisms. At a temperature of 140° F. to 145° F. - 30 minutes immersion is required.

B. Mess Kits. Each individual must sterilize his own kit. Fragments of food should be scraped from mess kits into a can or pit in the ground before washing. Why? The individual may have contaminated his food. He may be an early case or a carrier. Secondly when wastes are properly disposed, flies are not attracted.

Mess kits are washed in three galvanized iron cans. Two contain hot soapy water and the third hot clear water - in each the water is maintained at a near boiling temperature. Mess kits are thoroughly washed in each of the two cans of soapy water, then rinsed in hot clear water, and lastly they are allowed to air-dry.

Food particles are buried or burned.

The waste water is disposed of in a soakage pit or trench. (see page 108)

There are other methods than the one employing the use of three galvanized cans. The principle is the same.

C. Mess tables should be kept clean by scrubbing with soap and water after each meal. A removable middle leaf permits cleaning between the boards and the removal of food particles.

CONTAMINATION OF FOOD DURING PREPARATION AND SERVING

A. Food may be contaminated during the process of preparation and serving. The most important sources of contamination

are intestinal and respiratory discharges transferred to the food by food handlers. Furthermore, contact with contaminated utensils, insects or dust may also serve to infect the food.

B. FOOD HANDLERS

1. No one should be assigned to duty as a permanent food handler who has not been examined by a medical officer and certified to be free from communicable disease and not a carrier. Permanent food handlers should be re-examined at intervals of not more than 6 months.

2. Permanent food handlers' certificates should be kept posted.

3. No one should be considered fit for assignment to duty as a food handler who, when physically examined, presents evidence of acute or chronic inflammatory conditions of the respiratory tract, or any signs or symptoms of venereal disease, intestinal disease, or other communicable diseases.

4. No man is suited for duty as a food handler, if he has had typhoid fever or bacillary or amebic dysentery (he may be a carrier).

5. At times the feces and urine are examined bacteriologically to determine whether the man is a carrier of intestinal disease.

6. Cleanliness. It is equally important that all mess personnel wear clean clothing and have clean hands at all times. The fingernails should be cut short. The hands should be washed immediately after visiting the latrine.

Convenient facilities for washing the hands must be provided. In addition to washing the hands in soap and water, rinsing in a 2 per cent solution of cresol is a valuable precaution.

MENUS AND SERVING OF FOOD

A. Menus. Menus are prepared for the purpose of affording: (1) variety, (2) combinations of food that shall provide sufficient calories (for energy), protein, fat, carbohydrates, minerals, vitamins, and liquid. As a result of insufficient calories over a period of time, a man loses weight. Insufficient amounts of vitamin C over a period of time leads to scurvy (see miscellaneous diseases, Chapter 11), while insufficient amounts of Vitamin B lead to the development of beri-beri. Pellagra is another deficiency disease, due to an insufficiency of a part of the Vitamin B complex.

B. Serving. Food must be served in such a manner that it will not be contaminated during the process of serving (droplet infection, contaminated fingers, etc.)

DISPOSAL OF WASTES

Purpose of Proper Disposal of Wastes - (1) to deny flies a breeding place, (2) to deny flies access to material that may be a source of pathogenic organisms, (3) to deny flies access to material that would attract them to the vicinity inhabitated by humans, and (4) to control nuisances (odors).

Classification of Wastes-

1. HUMAN WASTES. Excreta, solid and liquids, and bath water.
2. KITCHEN WASTES. Liquid and solid.

3. ANIMAL WASTES. Liquid and solid.

4. RUBBISH.

Disposal of Human Wastes.

1. Importance of proper disposal. Human wastes play the most important role in the transmission of intestinal diseases because they (the wastes) are frequently carried from case or carrier into water which is to be used for drinking and cooking, or are conveyed to food by the hands, or by insects, rats, and mice.

2. Proper disposal is obtained by the use of properly constructed latrines which are properly maintained.

3. Latrines - general remarks.

a. Latrines should be fly-proofed.

b. Latrines should not be dug below the ground water level.

4. Latrines dug in clay are unsatisfactory since liquids will not be absorbed.

5. Latrines should be placarded, when closed, showing the date of closing and the organization.

6. Latrines should be located at least 100 yards from any mess, and so located that drainage into a source of water supply is impossible.

Latrines and Their Care.

1. STRADDLE TRENCH SOLID WASTES LATRINES. They are usually one foot wide, 2 feet deep, and 8 to 10 feet long.

Proper care depends upon:

(1) each man covering his excreta with earth,

(2) closing the trench by refilling with earth when the contents have reached within 1 foot of the surface ground.

(3) Spraying, if practicable, the trenches each day with crude oil.

2. DEEP PIT LATRINES. In order to make use of the standard quartermaster latrine box, a deep pit of exact dimensions must be dug to conform to the size of the latrine box.

The dimensions are: 2 feet wide, 8 feet long, and 4 to 10 feet deep.

Proper care of waste depends upon:

(1) proper flyproofing to prevent access of flies to fecal material and to prevent the escape of larvae in case flies successfully gain entrance and lay their eggs.

(a) Flyproofing is accomplished by the use of two methods. One method prevents larvae travelling sufficiently far from the pit to enable them to complete their metamorphosis into flies. Larvae are prevented from escaping by setting up a sort of "no man's land" - in this case it would be a "no larvae's land". An area of 4 feet wide all around the pit is excavated (dug out) to a depth of 6 inches. This area is then covered with burlap and soaked with crude oil. In addition the burlap hangs down the walls of the pit for a distance of 18 inches. The burlap outside the pit is covered with earth, tamped down, and more oil is added. In the absence of burlap or oil or both, soft earth may be hardened by first moistening with water and tamping.

Now for an explanation. "Why go to all this trouble?" you ask. There is a reason. The house fly lays her eggs on the excreta in the pit. The

larvae remain in the pit until they are mature (just before they develop into the next higher state of development - the pupa). As maturity is reached, they begin to look for a dry place in which to pupate. Mature larvae can penetrate through loose earth (light loam, or sand and loam) for a distance not over 4 feet. Freshly emerged adult insects can penetrate loose earth for a distance of one foot or more. (See page 138 for a description of the fly)

Surrounding the oiled and burlap treated area, there must be a drainage ditch not less than 6 inches in depth.

The second method of flyproofing is accomplished by tamping earth around the base of the latrine box to prevent the entrance and exit of flies. Self closing seat lids likewise prevent flies from coming and going.

(2) Constant Attention, rendered by a latrine orderly. The following points are important:

(a) The contents of the pit, the sides of the pit, and the interior of the box should be sprayed with crude oil daily.

(b) The seats should be scrubbed daily with soap and water, and twice a week should be scrubbed with a 2 per cent creosol solution. They should be dried after cleaning.

(c) The urine troughs should be scrubbed daily with soap and water.

(d) The seat covers should be kept closed when not in use.

(e) The box should be kept flytight by repairing it as necessary.

(f) Fly traps should be placed near each latrine.

(g) An ample supply of toilet paper should be available.

(3) Deep pit latrines should be closed when filled to within 2 feet of the surface. The box should be removed, the pit contents sprayed with crude oil and covered with burlap, and the pit filled with dirt domed 12 to 18 inches above the surface of the adjacent ground. The site should be placarded with the date of closure and the name of the organization. The same spot should not be used again for at least 1 year.

3. PAIL LATRINES. If it is impracticable to dig a pit (rock soil, etc.), the pail type of latrine is used. There is nothing mysterious about it, nor is it difficult to understand. Pails (buckets) are placed under the seat of a latrine box.

The pails should contain about 1 inch of a 2 percent solution of creosol; they must be removed and emptied daily. Excreta from the pails may be disposed of by burial or by incineration.

LIQUID WASTES

1. Urine disposal

a. Urine troughs are used when the soil is able to soak up the urine. Such troughs drain into a pit (pit latrine) and are constructed of wood. They are lined with tar or else they

are made of tin or galvanized iron.

b. Urine Soakage pits are used when the soil is unable to soak up the urine. The pit, 4 feet square and 4 feet deep, is filled with pieces of broken rock, flattened tin cans, brick, or broken bottles. At each corner of the pit are placed urinals of 2 inch pipe which extend 8 inches below the surface of the ground and 30 inches above. In the upper end of each pipe is placed a tar paper funnel containing grass or straw.

Proper care depends upon:

(1) daily removal of grass or straw and replacement with fresh material.

(2) daily cleansing of funnels with soap and water.

(3) weekly changing of funnels.

(4) prevention of clogging of the pit by keeping the surface free of debris, oil, etc.

(5) to close the pit - remove the pipes and cover the pit with dirt and sod.

2. Bath water.

Bath water may be disposed of in shallow trenches, or even onto the surface of the ground if the camp is to be of brief duration. Otherwise, a grease trap and soakage pit or trench should be installed, since the accumulation of soap will eventually prevent soakage into the ground.

3. DISPOSAL OF KITCHEN WASTES

Kitchen wastes are composed of:

1. Food remnants accumulated after meals and in the preparation of meals.

2. Water in which kitchen utensils and mess gear have been washed.

GARBAGE

It is worth repeating this important fact: garbage affords a breeding place to flies and a haven to animals in search of food. Both flies and animals can play a part in the spread of disease.

Disposal of Garbage - Methods

Garbage can disposed of in the following manner:

1. BURIAL - If the soil permits, garbage may be buried in trenches. which should be 2 to 3 feet deep. When they are filled to within 1 foot of the surface they should be filled with earth and tamped down.
2. SALE or GIFT - In this case the edible portion must be separated from the non-edible at the kitchens. Some non-edibles are: coffee grounds, tea leaves, egg shells, banana peels and stalks, fish heads and scales, citron rinds; and tin cans, paper and other rubbish.
3. HOG FEEDING - Garbage may be fed to hogs, provided they have been immunized against hog cholera. Food should be separated into edible and non-edible portions.
4. REDUCTION - A reduction plant is impracticable for a camp or cantonment.
5. Closed INCINERATION - An apparatus constructed for the purpose of burning garbage. Temperatures of 1400° F. to 1800° F. are obtained.
6. SEMI-CLOSED INCINERATORS - This type is primarily for field use. It is so constructed that it is protected from wind and rain. It has a good draught. The fact that it will burn

the garbage from 1000 troops (500 to 800 pounds) a day, speaks for its efficiency.

7. OPEN INCINERATOR - This type is less practicable since it consumes more fuel and is more difficult to operate. It is composed of a stack, a trench and a grate or similar material to support the garbage. The stack often has the shape of a barrel. Stacks may be made of stone or they may be made of a 50 gallon oil drum open at both ends. A fire is built at the intersection of two trenches that form a cross. Over the fire is placed a grate upon which is placed the barrel.

To obtain success: (1) garbage is added slowly. (2) Garbage is dumped carefully to avoid breaking or bending the top of the stack, and (3) the firebox is cleaned frequently to avoid suffocation of the fire as a result of clogging with ashes.

Disposal of liquid Wastes - Methods

You have a general idea of sewers. Sewers carry away human and kitchen wastes.

In the field, in the absence of a sewage system, it is necessary to resort to other methods. The only practicable method is to use the soil as a blotter - to absorb liquid. Of course, absorption can be hindered when the pores of the earth are clogged by grease, which is characteristic. Grease poured on the ground provides a breeding place for flies.

1. Pour into trenches or pits. This method is satisfactory in bivouac. On departure, the trenches or pits are filled in with earth.

2. Soakage pits. A second method of disposal is to construct a soakage pit (like urine soakage pits), equipped with a grease trap instead of a urine trough.

Let us pause a moment in order to learn about a grease trap.

GREASE TRAPS - Their purpose is to remove grease from liquid wastes. Grease hinders absorption. There are two general types of grease traps.

a. Filter grease trap - Grease can be filtered from waste liquid by means of hay, grass, straw, sand, gravel, or cloth. These are placed in a bucket, the bottom of which has many (perhaps 30) small holes. The method by which it operates is not difficult to understand. Liquid waste is poured into such a filter grease trap. The hay or straw, filters out the grease and the remaining waste goes out the bucket via the holes into a soakage pit. The filtering material is removed as needed and burned.

b. Baffle grease traps - This type of trap is an interesting example of the application of a fact known to us all. The fact is this: grease rises to the surface of water as it thickens or hardens. Grease is fat and fat is lighter than water. Can this fact be applied to any practicable value? Yes. If a barrel contained greasy water, the water (and grease) would escape from any opening present. By changing the grease to a solid which floats, the clue of a method is offered. Grease floats on top

of the water. Place a baffle (a board) in the barrel so as to divide it into two chambers, but don't have the baffle go all the way to bottom. An inch from the bottom is satisfactory. The chamber which contains the bung (outlet hole) is then ready to act as reservoir for now greasy water. The other side can be the one into which waste water is poured. This is how the baffle trap function: Pour some cool water into the barrel. Next, pour warm waste liquid into the receiving side. As the warm waste water comes in contact with the cool water, grease forms and floats to the top. The remaining grease-less water is ready to be released from the outlet side of the barrel. Remove the cork and out comes water free of grease. Retained grease should be removed at daily intervals, and the trap emptied and scrubbed weekly.

3. Soakage trenches - These are employed when condition of the ground makes the construction of a soakage pit impractical. A soakage trench is made in this manner: dig a square pit 1 foot deep. From each corner of the square dig a trench 1 foot wide and 6 feet long. The depth is 1 foot at the corner of the square and 18 inches at the outer end. Next, fill the square pit and the trenches with broken rock, broken bottles, flattened tin cans, etc. Then install a grease trap within the broken rock which fills the square pit. Thus, there is provided a relatively large surface area for the

purposes of absorption. The filter must remove as much debris and grease as possible, otherwise clogging will occur.

ANIMAL WASTES (MANURE)

Horse manure is an ideal breeding place for flies. Efforts are therefore directed to the prevention of providing such breeding places.

DISPOSAL OF MANURE - VARIOUS METHODS

1. BY DRYING. The manure is scattered by rake and dried in the sunlight. When dry, it is removed, then burned or used to fill in low areas.
2. GIFT OR SALE - A satisfactory method of disposal, which requires proper collection and transportation.
3. COMPOSTING, or the close packing of manure on a platform. If properly done, it eliminates manure as a breeding place for flies. Again, we have here another example of the scientific application of accurate knowledge. When manure is closely packed, a temperature of 140-160° F. is reached at a depth of 1 foot below the surface of the stacked manure. At this temperature, fly eggs and fly larvae quickly die. Those flies that come to feed on the surface can be easily destroyed by larvicides (fly poisons).

There is a proper method of composting manure. The detail will not be given here. They can be found in FM 21-10 or FM 8-4 or in TM 8-220.

4. INCINERATION - Fresh manure can be dumped on the ground in long windows, sprayed with oil and burned. If dried for 3 - 4 days, it may be burned with little or no oil.

5. AS FERTILIZER - Fresh manure can be used, but it may lead to a fly muisance, since fresh manure contains fly eggs. Even if plowed under, the nuisance is not avoided (larvae can migrate).

RUBBISH

Tin cans and burned bones are examples of rubbish. Rubbish is disposed of on dumps. Dumps are of sanitary importance because they can afford harboring places for rats or organic matter (food) which may serve as breeding material or food for flies.

The dump is situated far enough away from camp in order to produce the least nuisance due to appearance or odors. Tin cans are flattened to prevent the collection of water, in which mosquitoes may breed. Organic material is burned in an incinerator in order to destroy such material that might attract insects or animals, especially rats.

Often, it is practical to place dumps in unsightly hollows, holes or excavations with the idea of filling them up and later covering them with vegetation.

So much for the wastes and their disposal, a big subject of great importance. Finally, an outline for sanitary inspection is given below. It affords a brief review of those particulars which are especially important for the maintenance of a sanitary mess.

OUTLINE FOR SANITARY INSPECTION OF MESS

The following outline may be followed in making a complete sanitary inspection of a mess. It is suggested as a guide only.

A. Attendants:

Is mess sergeant qualified for position as to —

Knowledge of food requirements and preparation of food?

Ability to maintain discipline?

Business ability?

Are Cooks adequately trained? How?

Have food handlers all had "food handlers'" examinations and been certified as to health condition by the surgeon?

Are food handlers cleanly as to—

Clothing?

Hair?

Hands (inspect fingernails)?

Personal habits? Care in washing hands after urination and defecation.

Is there a convenient washroom for food handlers?

B. Menus:

Does food served correspond with menu posted?

Are menus well balanced and amount of food adequate?

Check file of menus and mess account balance sheet.

Note: Daily food supplied each man should yield at least 3,000 calories, provide at least 100 grams of protein, and contain adequate vitamins.

C. Food supplies:

Meat and fish:

Source.

Quality.

Freshness.

Handling.

Storage.

Preparation.

Milk and dairy products:

Same consideration as meat.

Has bacteriological and chemical analysis been made?

Is milk raw or pasteurized?

Fruit and vegetables:

Is supply adequate and satisfactory?

Are men educated to their use?

Canned foods:

Is supply satisfactory?

Bread and bakery products:

Source.

Quality.

Delivery method

Storage.

D. Food storages:

Refrigerator:

Is space adequate?

Condition and sufficiency

Cleanliness.

Disposal of drip water.

E. Pantries:

General neatness, cleanliness, and adequacy of storage facilities.

Vegetable storage:

Have vegetable bins been provided?

Condition of vegetables in storage.

Do facilities for storage guard against undue wastage by rotting?

F. Bread Boxes:

Sufficiency, cleanliness, and neatness.

G. Food preparation and serving:

Refer to cooks' training.

Is food served in a reasonably attractive manner?

H. Police:

Dishwashing:

Does the method meet the requirements of Army Regulations?

Are trays, dishes, and utensils clean? Look between fork tines and around hilt of knife.

Kitchen utensils:

Are pots and pans kept grease free?

Are they properly stored when not in use?

Are knives and forks clean? Look around handles and hilts.

Is there a knife rack and a knife sharpener?

Are stoves kept clean?

Is fuel supply adequate?

Kitchen police:

Cleanliness of floors, walls, and ceilings.

Are dirty rags allowed to accumulate on ledges, top of bread box, top of refrigerators, etc.?

Are personal belongings of mess attendants allowed to accumulate in kitchen?

I. Waste disposal:

Is waste handled in a cleanly, satisfactory manner inside the kitchens and storerooms?

Is vegetable preparation and peeling carried out in a neat and satisfactory manner?

Is waste properly sorted and kept in proper receptacles?

Ashes.

Combustible trash and tin cans.

Edible garbage for piggery.

Non-edible garbage.

Are empty cans crushed and perforated before going to the trash can?

Has a trash and garbage stand been provided? Is it kept clean?

Is the surrounding area kept dry and free from soil pollution?

Is waste removed at reasonable intervals?

Are clean containers provided at reasonable intervals?

How and by whom are containers washed?

How are wastes disposed of:

Ashes to dump? Location of dump?

Combustible trash burned? Where?

Garbage incindrated? Or sold?

If garbage is sold, are terms of contract being met as to—

Frequency of collection?

Method of collection?

Cleanliness of cans?

J. Insects and rodents:

Is mess screened adequately?

Is there a supply of fly swatters or other fly destroyers? Are they used?

Have fly traps been provided and are they kept properly baited and set up for use?

Are roaches and other insects present? If so, what method is being used to control them?

Are rodents troublesome? What steps have been taken for their destruction?

Chapter 18.

INSECTS AND RODENTS. HOW TO CONTROL THEM.

It is customary to regard insects as transmitting agencies; and certain rodents as the sources of infection of certain diseases. (See page 140)

Air, water, food and insects--the transmitting agents, the lines of communication, the supply lines of disease. Now we come to the fourth and last of those supply lines--the insects.

The insects of importance to us are:

Mosquito	Bedbug
flea	roach
louse (plural, lice)	biting fly
tick	house fly

The house fly, so important in the spread of intestinal diseases, will be the last insect studied.

Some rodents of importance are:

rats	rabbit
mouse	prairie dog
squirrel	

It is important to realize this important fact: the pathogenic organisms responsible for the insect-borne diseases may have other sources or reservoirs than the rodents listed above. For instance, the chipmunk, opossum and armadillo can be reservoirs--in fact, they often are in some places. The problem of controlling one of the diseases of this group becomes more involved as we learn that the organism, causing African sleeping sickness, is found in the antelope, oxen, sheep and goats. It is probably true that many disea-

ses have their reservoir in more than one animal. Even some birds have been found to harbor pathogenic organisms. This much can be said: Many mammals and birds are reservoirs for organisms pathogenic to man. There are many facts to discover. New knowledge will be correlated. New control measures will be proposed and tried. Those particular measures which prove valuable in reducing the number of sick will in time be accepted, taught and employed.

CONTROL OF INSECT-BORNE DISEASE

Perhaps the most important weapon of control is a knowledge of the characteristics of various insects. In order to defend curselves with any degree of success, that is, intelligently, we must direct our attack in such a manner that the insect is the loser.

Because each insect possesses different characteristics, we shall discuss each one separately.

MOSQUITO CONTROL

A. Characteristics of the mosquito.

1. Whereas man attains adulthood by passing through infancy, puberty and adolescence, the mosquito goes through similar stages: egg, larva, pupa, and finally reaches adulthood.

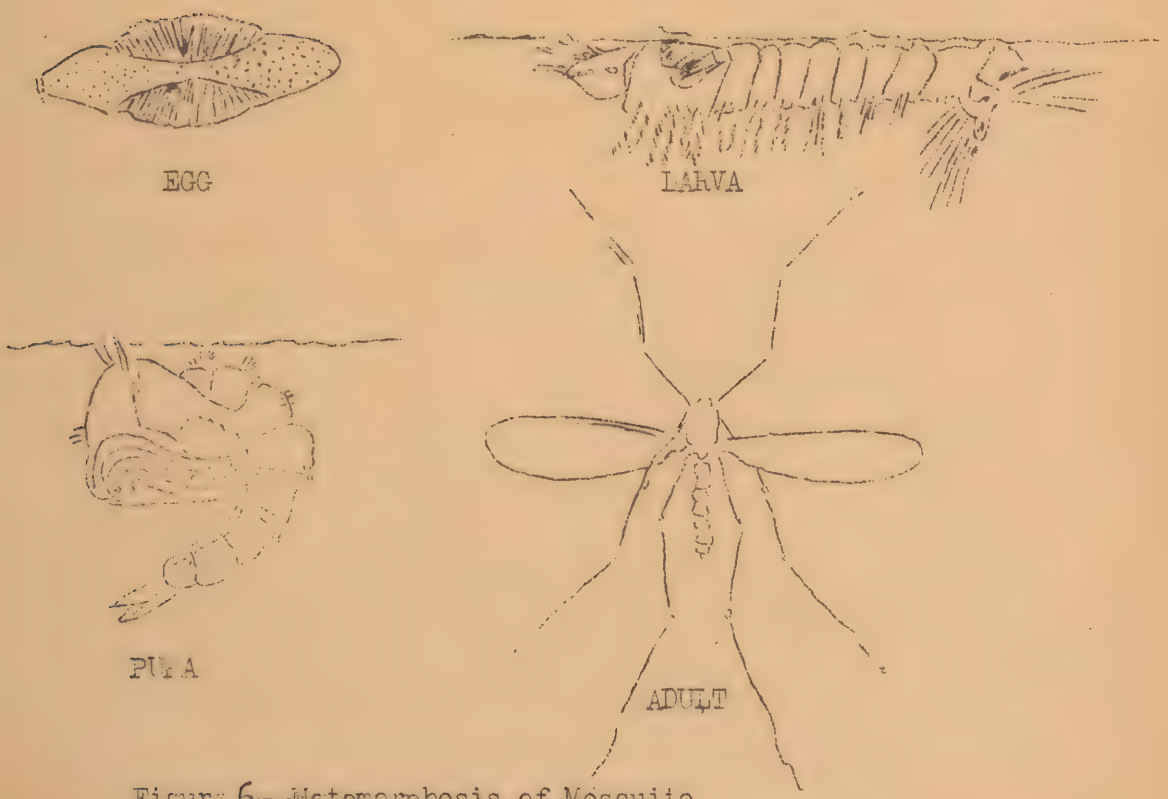


Figure 6--Metamorphosis of Mosquito

2. Mosquitoes breed (lay eggs) in water.

3. The first three stages of their life are spent in water.

4. The larva is frisky; he is called a "wriggler".

5. Eggs, larvae and pupae are not dangerous, in that they cannot transmit pathogenic organisms to man. They are in the water and unable to get away.

6. Like the flying cadet, the mosquito becomes a real striking power, when it gets its "wings", thus, automatically becoming an adult--a flying adult.

7. From eggs to a flying adult--only 16 to 18 days!

8. The female is the one to fear--she lives on blood, going from one person to another, getting a drop here, a drop there with each bite.

9. When she bites someone with malaria, for instance, she not only gets the blood she wants, but she also gets some malarial parasites. Then she has a bomb load. Jones may be the victim, poor Jones. The mosquito may bite him, get his blood, and if she has a bomb load of parasites, Jones gets it. No noise, no thunder, just the drone of the escaping mosquito.

10. There are day bombers (or biters), night bombers, and all around the clock bombers.

11. The bombers carrying malaria bite only at night, dusk and dawn. They are called Anopheles mosquitoes.

12. The day biters, called Aedes Egypti, transmit dengue and yellow fever.

13. Culex mosquitoes transmit filariasis. They are ready for

action night or day.

14. Anopheles prefer the country life; they are usually found about streams and swamps.

15. Aedes do not care for the rigors of the rugged life. They are usually found near human habitations (rain barrels, buckets, gutters).

16. Culex has no particular preferences. "He is the man of the world." Swamps, cesspools, habitations--they all appeal to him.

17. Some mosquitoes have a range of flight of 1 mile.

B. Control of Mosquitoes

Control is based on the characteristics of the mosquito. Instead of "getting them" (eggs, larvae, pupae)"on the ground," we get them on the water.

Instead of dropping bombs, we can drop chemicals on their breeding places (where female bombers are created).

Instead of blacking out our barracks, we screen our doors and windows.

Instead of putting on helmets, we wear mosquito nets.

Following is an outline of mosquito control measures:

I. Elimination of breeding places.

II. Destruction of mosquito larvae and adults.

III. Protection of man from the bites of mosquitoes.

IV. Isolation of cases and carriers to prevent infection of mosquitoes.

V. Treatment of cases and carriers.

I. Elimination of breeding places.

A. Filling of small depressions where water collects.

B. Drainage of small ponds or swamps.

C. Stream training - effective but requires considerable labor.

D. Emptying water containers.

II. Destruction of larvae (measures must be repeated every 7-10 days).

A. Oiling surface of water with a thin film.

B. Paris green poison spread on surface of water.

1. Spread by

a. Hand.

b. Hand blowers.

c. Airplanes.

C. Panama larvicide (a phenol larvicide).

1. Sprayed; mixed with the water.

D. Destruction by natural enemies.

1. Stocking ponds or small streams with certain minnows or fish.

III. Destruction of adults.

A. Swatting.

B. Spraying.

1. This is of value in buildings.

C. Hand catching.

1. Slow and difficult.

2. Used mostly to secure specimens for identification.

IV. Protection of the individuals.

A. Screening.

B. Mosquito nets.

C. Repellants.

1. Citronelle

2. A mixture of 1 part Epsom salts and 10 parts water daubed on the skin is moderately effective in repelling mosquitoes.

D. Medical prophylaxis.

1. Quinine

2. Atabrine.

LICE

The louse, or "cootie", is a small wingless insect parasitic upon mammals and birds. It is important to give lice recognition. Though insignificant in size, they can carry such a disease as typhus fever. Furthermore, lice thrive in conditions of crowding--conditions which are likely to occur in wartime. If personal cleanliness is difficult to maintain, because of war conditions, lice are more apt to retain their lodgings (man's body) for a longer period of time than usual.

We usually think of three types of lice: body lice, head louse, and pubic louse ("crabs").

Characteristics of lice:

1. Life cycle: egg (nit), larva, adult.

2. The adult is about 1/16 inch in length.

3. All three types of lice depend on human blood for life.

4. The higher the temperature, the more food they need.

A. At 98° F. they can live 2 days without food.

B. At 104° F. they die within 12 hours without food.

5. Location on the human body.

A. Head louse.

a. Remains attached to the hairs of the head.

B. Crab louse.

a. Mainly about genital region.

b. May be attached to haris of any part of body.

C. Body louse.

a. Attached to clothing except when eating.

6. Spread of lice.

A. By adult lice; or by eggs being dropped off the body in straw, debris, blankets, clothing, or latrine seats. Eggs may be attached to hairs that come from the head.

B. By sexual intercourse.

7. Destruction of lice.

A. Lice and eggs killed in 5 minutes by dry heat of 131° F. and in 1 minute at 155°F. or

B. By boiling in water 30 seconds.

8. Mode of transmission of diseases.

A. Not by act of biting, as you might suppose.

B. They defecate as they feed. The viruses in the excreta are scratched into the skin by the person bitten.

9. Factors that predispose to lice infestation.

a. Overcrowding.

1. Lice readily pass from person to person when infested persons sleep near each other.

b. Insufficient bathing and laundry facilities.

c. Neglect of personal cleanliness.

d. Intercourse with infested persons.

Methods of control of lice:

Delousing, or ridding the body, clothes and equipment of lice, is the principle method of control.

1. Delousing must be universally effective throughout the unit. All individuals, their clothing, and their equipment should be disinfested simultaneously. If one individual is missed, reinfestation of the entire unit will soon occur. Prompt action should be taken at the first indication of lice in a unit.

2. Delousing of a unit includes the following procedures:

   a. All individuals to bathe thoroughly and to shave various parts of the body if necessary. (discussed below).

   b. Clothing and equipment to be deloused. (discussed below).

   c. Latrines, beds, and any objects possibly harboring lice to be disinfested or destroyed.

   d. Clean clothing to be issued to all individuals.

A. Disinfestation of the body.

I. Bathing.

a. General. Bathing is an essential part of any delousing program and should be performed while clothing and equipment are being deloused. It may be carried on either in a fixed installation such as a quartermaster bathing and delousing unit or by means of improvised shower baths. An excellent

soap to use is made as follows:

Boil one part of ordinary issue soap in four parts of water.

Add two parts of kerosene.

Mix with four parts of water.

b. Showers.

1. A simple device for bathing can be made from a water sterilizing bag suspended from a scaffold or a tree limb. One faucet of the bag is replaced by a rubber tube, in the end of which is placed a short section of pipe closed at one end and perforated in numerous places to act as shower head. A stone-filled soakage pit should be constructed underneath the shower, being covered with boards on which the men may stand. A grease trap should be installed if the pits are to be in use for more than 2 days.

2. A large tin can, such as a gasoline can, with a perforated bottom may be suspended from a tree or platform. In its operation one man pours water through the can while another bathes.

3. A more elaborate device may be made by inserting a small perforated tin can into a hole cut in the bottom of a barrel. The valve is constructed of a plunger which fits into the can. This plunger is controlled by means of a lever and handle within reach of the bather.

c. Shaving. Bathing with soap will not always destroy all of the eggs attached to the hairs of the body. When infestation is evidenced by the presence of eggs on the hairs or by indication of louse bites, the hair in the armpits, about the genitals, and if necessary on the chest and legs should be shaved and clipped. In peacetime, shaving should be routinely employed for the removal of crab lice. If at any time shaving or clipping is not practicable, the infested parts of the body should be thoroughly scrubbed with vinegar, kerosene, or gasoline (lead free). This will remove the eggs as well as the adults.

d. Shampooing. If head lice are present, disinfestation can be accomplished by loosening the eggs from the hairs by the thorough application of vinegar followed by shampooing the scalp with hot, soapy water containing 25 per cent of kerosene. This removes the detached eggs and kills the adult and larval forms. After shampooing, the hair should be combed with a fine-toothed comb to remove any nits not removed by washing. Where practicable the hair should be clipped short.

B. Disinfestation of clothing and equipment.

1. General. Improper treatment will damage certain materials. Steam will not seriously affect cotton or woolen cloth, but will seriously damage articles made of leather, felt, or webbing. Boiling water will shrink woolen cloth. Dry

heat is practically harmless for all articles except wood, which it will damage somewhat.

II. Available methods. Outside of permanent installations and delousing units, the disinfestation of clothing and equipment is done by means of one of the following methods:

a. Mobile disinfestor (quartermaster function).

b. Serbian barrel type of disinfestor. Serbian barrel type disinfestors are company installations. They consist of a barrel or a similar container for the material to be disinfested. In the lower part of them there is a receptacle for water and an improvised furnace or firebox.

c. Improvised hot air disinfestors. Clothing and equipment may be placed in ovens, boxes, or cans and subjected to dry heat. Small buildings or dugouts may be converted into hot air disinfestors by installing heating apparatus which will heat the air to 160° F. Clothing should be hung loosely and exposed for about 30 minutes.

d. Hot irons. Clothing can be deloused by removing the adult lice by hand and then killing the eggs by ironing the cloth, especially the seams and folds, with a hot iron. An ordinary sadiron or a piece of iron pipe or scrap iron with a wooden handle may be used for this purpose. This method is laborious and uncertain.

e. Hot water. Cotton, linen, or silk clothing may be disinfested by immersion in boiling water for 1 minute. This will kill the virus of the insect-borne diseases as well

as the lice. A temperature of 135° F. for 5 minutes will kill lice, but will not destroy the viruses. This method should not be used for wool, leather, felt or web-material.

f. Storage. Storage of infested clothing and equipment will accomplish disinfestation by depriving the lice of a food supply. The exact time required is dependent on the temperature. A safe rule is keep articles in storage at least 38 days. In this time, successive batches of eggs will have hatched, and the larvae and adults will have died. This method is frequently very practicable for disinfesting clothing and blankets in hospitals and camps, providing storage facilities are available and clean clothing and equipment are available. The storage rooms should be kept dry. Freshly infested articles should not be placed with those that have been in storage for some time. No article should be removed from a room until all articles have been in storage at least 30 days.

g. Chemicals. Leather, web materials, shoes and hats which cannot be disinfested by other means should be immersed in a 5 percent solution of cresol for 30 minutes. Clothing may be disinfested in 2 percent cresol, but this is rarely advisable.

FLEAS

The flea is a blood-sucking insect, parasitic upon men and other mammals. It is wingless, However, its remarkable power of leaping enables it to "go places". These little insects prefer to live on rats, but should rat lodgings become scarce, they usually leap over to a man and settle down. Of course rats are the commonest reservoir of plague bacilli, which a flea may get in a mouthful of blood. The bacilli may be transmitted to us by the flea!

Characteristics of the flea.

1. Life cycle: egg, larva, pupa, adult
2. The larva is a footless, wormlike maggot which is very active.
3. The rat flea is the most common vector of bubonic plague and endemic typhus.

Control of Fleas

A. Elimination of animal hosts. Elimination of animal hosts is the essential control measure. It must include attention not only to rats and squirrels but also to pet dogs and ca

1. Pet animals may be freed of adult fleas by a variety of commercial preparations. Washing in 3 per cent solution of cresol or 10 per cent emulsion of kerosene, followed by thorough rinsing, will also destroy fleas. While pets are being treated, blankets or bed occupied by them should simultaneously be disinfected.
2. Rats are not only important as reservoirs of infection of bubonic plague and typhus fever but also factors in the spread of several other diseases. Control of rats is a difficult problem. The supervision of rat-control

campaigns is a normal function of the Medical Department. The principle control measures are discussed on page 141 .

B. Destruction of fleas. Fleas in buildings may be destroyed by scrubbing the interior of the rooms with soapy water containing 10 per cent kerosene and 5 per cent cresol. The floor should be thoroughly wet. Barns and barnyards may be disinfected by spraying with a creosote oil containing 10 per cent tar acids.

TICKS

Ticks are small hardy, six-legged, wingless insects, parasitic upon mammals and birds.

Characteristics of Ticks:

1. Life cycle: egg, larva, nymph, adult
2. The pathogenic organism that causes Rocky Mountain Spotted Fever, passes from the female tick to the eggs she lays. From the eggs the organisms are passed successively to the larva, nymph, and adult.
3. Adults can live 2 years without food.
4. Extremely cold weather will not kill ticks in any stage.

CONTROL OF TICKS

Control Measures

1. Burn infested buildings if latter are of little value.
2. Insecticide for infested floors, walls and furniture.
   A. Kerosene or cresol.
3. Control of their wild animal hosts on whom larval and nymph forms feed.
   A. Squirrels, rabbits, prairie dogs, woodchucks may be eradicated from infested areas, This is difficult,

to say the least.

a. Trapping, shooting, poisoning.

b. Burning underbrush.

4. Sheep grazing helps reduce number of ticks.

5. Control of individuals in tick infested areas.

A. Individuals should daily examine their exposed skin and promptly remove the ticks, since ticks may not infect a person until some time after attaching themselves to the skin.

BEDBUGS

I. General. Bedbugs exist wherever they can live in close association with man. They frequently become a serious pest in barracks and guardhouses. It has not been proved that bedbugs transmit any disease to man. Because they are bloodsucking insects, however, it is possible that they may transmit any disease in which there is a blood stream infection. It has been said that European bedbugs transmit some diseases.

II. Characteristics.

A. Bedbugs develop through the egg and larva, to become adults. The eggs are white, oval in shape, and about 1 millimeter long. They are deposited in cracks, crevices, and any place which affords protection and concealment.

B. Bedbugs feed at night. They are capable of surviving for 6 months without food.

C. Bedbugs are usually spread from place to place in clothing, bedding, baggage, or furniture. They hide in the seams of mattresses and pillowcases and in cracks and crevices of any wooden or metal structure.

III. Control Measures.

A. Fumigation. Fumigation is the most effective bedbug control measure but should not be attempted by untrained personnel.

B. Liquid insecticides. Liquid insecticides are effective if thoroughly and repeatedly used. An effective mixture for this purpose is kerosene containing 10 per cent of cresol or 5 per cent of turpentine. Kerosene alone may be used. A kerosene or alcoholic extract of pyrethrum is also effective. A paint brush should be used in the application of the liquid insecticide. (A spray is not as effective). This procedure should be repeated three or four times at intervals of 1 week to kill all developing eggs. Steam should be used to eradicate bedbugs from mattresses, blankets, and other bedding. Dry cleaning with gasoline and washing in hot water will usually eliminate them. Hand picking, brushing, and shaking is recommended. Flaming the cracks of steel cots with a blowtorch is quite effective. Kerosene may be used as a repellent by saturating wicks of woolen material and placing them in the coil springs of metal cots. Fresh applications of kerosene should be made weekly.

ROACHES AND ANTS.

I. General. Roaches and ants are not transmitting agencies for any insect-borne diseases. They are, however, serious nuisances in messes and may transmit intestinal diseases by contamination of food.

II. Control.

A. The most important control measure is to deprive ants and roaches of an available food supply by cleanliness of the mess; and by

protection of food supplies by refrigerators and screened cabinets. The placing of table and refrigerator legs in cans containing water will protect food from ants.

B. Sodium flucride should be placed in cracks and corners and about water pipes two or three times a week. Spraying of cabinets, corners, and cracks in the wall with the issue liquid insecticide will destroy many roaches. This is best done at night.

C. Complete eradication of ants can be accomplished only if their nest is found and destroyed. Once located, the nest may be destroyed by pouring boiling water or kerosene into it.

FLIES

There are many varieties of flies. The house fly is one variety. It especially attracts our attention because of the part it plays in the transmission of intestinal diseases. House flies breed rapidly in manure, human feces, garbage or yard filth. The house fly and brown rat have one thing in common. They are filthy. They prefer filthy food and a filthy environment. However, they are not so high-brow, that they refuse to enter clean mess halls, clean kitchens, and sick rooms. Flies seek out the moisture about our nose, eyes, and mouth; the moisture in wounds and sores. They quickly pass from one person to another. They visit those who are in a natural sleep as well as those in a drunken sleep.

To digress a moment: Horseflies can mechanically transmit tularemia. Mango flies, a variety of horse fly, carry loa loa, a filarial disease.

Characteristics of housefly.

1. Development. The fly passes through four stages--the egg, the larva, the pupa, and the adult. The eggs are deposited by the adult female in masses of 150-200 in warm, moist organic materials, pre-

ferably horse manure. The larvae are worm-like creatures; they are motile and feed on organic material. Upon maturity they migrate to a dry cool place and pupate. Larvae are quickly killed at a temperature of 115° F. The pupa stage lasts 2-8 days. The adult emerges from the pupae case and is ready to fly as soon as its wings harden.

HOUSE FLY : STAGE OF DEVELOPMENT

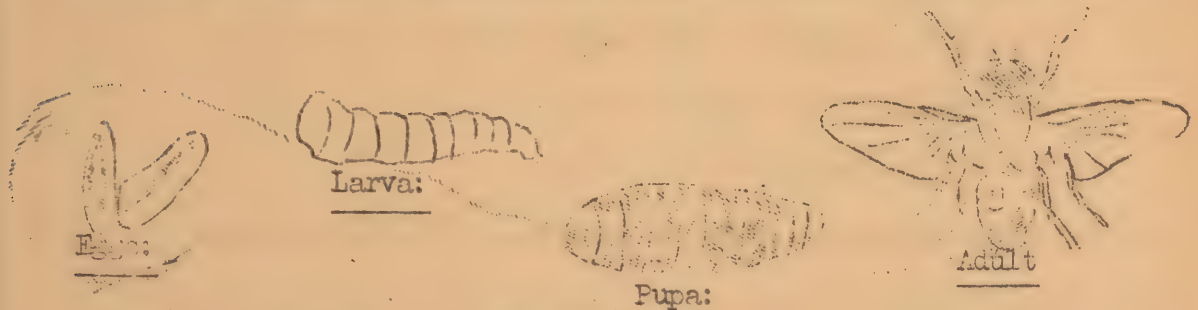


Fig. 7 Metamorphosis of the House Fly.

2. They breed by choice in horse manure, human excreta, and fermentory vegetable wastes.

3. Larvae must have moisture, warmth, and soluble food for development.

4. Temperatures over 115° F. kill larvae and eggs.

5. Larvae tend to migrate from the breeding material prior to pupation.

6. Larvae and adults are able to crawl through loose manure or earth.

7. Adult flies are attracted to food by odor.

8. They tend to go toward light.

9. They tend to rest on vertical surfaces and hanging objects.

10. The optimum temperature for breeding is 80° - 95° F.

11. The range of flight is 200 - 1,000 yards.

12. The number is greatest in the late summer and early fall.

13. Continuous breeding may occur during the winter in heated buildings.

14. A single fly may carry 6,000,000 bacteria upon its surface and 28,000,000 in its intestinal tract!

Control Measures:

I. Control of breeding places.

A. Proper disposal of horse manure.

a. By composting a temperature of 140 - 160° F. is reached at a depth of 1 foot below the surface of the manure.

B. Proper disposal of human excreta denies flies access to excreta.

C. Proper disposal of garbage, denies flies access to garbage.

II. Larvicides.

A. Used chiefly in connection with compost piles and latrines.

B. Examples:

1. Waste motor oil.

2. Crude oil.

3. Cresol, Kerosene, Fuel Oil } as a mixture.

III. Destruction of adult flies.

A. Swatting.

B. Poisons.

C. Fly sprays.

D. Fly paper and wire.

E. Fly traps.

1. The most common means of destruction of flies in camps is the use of fly traps.

a. Principles of Fly Trap.

(1) Two main parts.

(a) Bait chamber is the lower, darker part into which flies go, being attracted by the odor of bait.

(b) Trap chamber is the upper, lighter part connected with bait chamber by a small opening through which flies crawl toward the light after having fed on the bait.

RODENTS

Rats, mice, squirrels are rodents. Only a few are mentioned of this vast group which comprises more than 1/3 of all living mammals. Rats are the chief interest to us, because they are the main reservoir of plague bacilli and because they are the "home" of the rat flea. Beside acting as a reservoir, they may be instrumental in spreading trichinella parasites and some of the tapeworms.

Rats may be classified as: Brown rats, black rats, and roof rats:

Rats are very destructive. They gnaw through wooden bins and floors in search of grain and other foods. In the year 1919 it was estimated that rats in the United States caused $167,000,000 property damage.

Characteristics of Rats:

1. They are primarily nocturnal animals.
2. Great travelers, since they are found
   a. on ships.
   b. in boxcars.
3. Intelligent and cautious.
4. The brown rat:
   a. Cannot climb.
      (1) Hence keeps mainly to lower floors and basements.
   b. A burrowing animal.
      (1) Will burrow into hardest soil to live and breed.
   c. Great gnawing ability.
   d. Will eat anything without reference to its degree of freshness or decay.
5. Black rat and roof rat.
   a. Excellent climbers.
   b. Live in hollow walls, garrets, boxes, barrels, etc.
   c. Clean habits.
      (1) Prefer to eat grain, and fresh, clean food.

RAT CONTROL

I. Control Measures.

A. Suppressive measures.

1. Preventing rats from reaching a food supply and places where they can nest and breed.

B. Destructive Measures.

1. Poisoning.
2. Trapping.

3. Fumigation.

4. Use of natural enemies.

II. The suppressive measures of control are:

A. Ratproofing

1. Especially temporary buildings for storehouses.

2. Methods.

a. Concrete floors and walls or

b. Brick and stone walls, closing all occlusions with metal flashings, grating, or screening.

3. Buildings not ratproofed.

a. Elevate the floor.

b. Put food in containers.

III. The destructive measures of control are:

A. Poisoning.

1. An effective method if there are large numbers of rats.

2. Will not kill all of the rats, because

a. Many soon learn not to touch the bait.

3. Methods which are non-poisonous to children, dogs, cats.

a. Use of red squill mixed with food.

b. Use of barium carbonate with food.

4. Methods which are poisonous to all animals.

a. Arsenic oxide, phosphorus, strychnine, thallium.

5. Bait.

a. Preparation

b. Handle with rubber gloves and forceps.

c. Distribute in late afternoon.

d. Distribute along rat runways.

(1) Alongside walls or similar objects.

6. Pre-baiting.

a. Use of unpoisoned food several days prior to use of poisoned food.

B. Trapping.

1. An effective method, but it requires more skill and labor than poisoning.

a. Rats become suspicious of traps unless skillfully set.

2. A good method for use in large warehouses or storerooms, if used persistently and systematically.

a. Can be used constantly to destroy new arrivals.

3. Types of traps.

a. Snap traps (springs).

b. Cage traps.

(1) Rats soon become suspicious.

4. Bait.

a. Fried bacon, fish, cheese, liver, tomatoes, doughnuts, fresh bread, cantaloupe.

5. Trap setting.

a. Use large bait and fasten securely.

b. Place along rat runways.

c. To remove odor of human hands it is necessary to scald or flame frequently.

d. Can deodorize traps by

(1) Dipping in hot melted paraffine.

C. Fumigation (use of a gas)

1. Hydrocyanic acid gas and sulfur dioxide.

   a. Too difficult to use in the field very effectively.

2. Carbon monoxide.

   a. Pipe or rubber hose from automobile exhaust to rat hole or burrow, etc.

      (1) Use rich mixture on carburetor.

      (2) Use gas for 10 minutes.

      (3) Holes and burrows should be as air tight as possible by sealing the cracks and openings.

3. Carbon disulphide on balls of cotton or waste may be plugged in rat burrows. This is more effective in damp weather or when ground is damp.

PART IV

SUSCEPTIBLES: THEIR PROTECTION

On what principles are communicable diseases based? Why do people get sick? What can you do about it? Since the days of Pasteur, a vast storehouse of knowledge has accumulated. Curiosity, facts, study, trial and error have lead to the development of certain principles or fundamental facts. These principles never change, hence we can refer to them as laws. Military HYGIENE is the study and understanding of these laws. SANITATION is the application of these laws. It is the art by which we adjust our living conditions and ourselves in accordance with the laws of hygiene. It is a law that water can transmit the germs which cause typhoid fever. The art of making the water safe (purification) for human consumption, is an adjustment we make. Such an adjustment is a sanitary measure.

Personal Hygiene is a term with which we are familiar. Actually it refers to those laws of hygiene that are applicable to an individual. However, the term has come to mean the application of certain measures whose purpose is to maintain one's own health by means of proper care of: (1) body, (2) equipment, and (3) the area one occupies.

Susceptibles may be protected by:

1. Isolation of cases or quarantine of contacts.
2. Immunization.
3. A suitable environment.
4. Measures to maintain health.

1. Isolation and Quarantine

The isolation of the sick and the quarantine of contacts, separate them from the susceptibles in order to prevent further spread of the disease. Disinfection is a part of isolation and quarantine.

2. Immunization is another means of protecting susceptibles. There are

vaccines for the following diseases: typhoid and paratyphoid fever, smallpox, cholera, diphtheria, tetanus, yellow fever, typhus and plague.

3. Environment

Susceptibles can gain varying degrees of protection by providing an environment which will prevent or limit the spread of infective material.

Examples are:

a. Proper housing

(1) Ventilation

(2) Heating

(3) Lighting

(4) Cleanliness

b. Insect control.

c. Rodent control.

d. Food control.

e. Proper waste disposal.

4. Measures to maintain health.

These measures are designed to maintain health and vitality. Some of these measures are carried out for us (environmental); some we can only do ourselves (personal). For example, our food is bought, inspected, stored, cooked and served by those skilled in these techniques. On the other hand, your hands are washed and your teeth are brushed by yourself. Such personal functions are measures of personal hygiene. To separate in detail the environmental measures from the personal is practically impossible, because of overlapping, and, because measures that are personal today may be environmental tomorrow.

Environmental factors:

1. Food

Good food, nutritionally prepared, properly prepared, and

served is vitally necessary to good health.

2. Clothing.

Proper and adequate clothing protects the soldier from undue exposure to adverse climatic conditions, maintaining his general resistance to many diseases, especially the respiratory group.

3. Activity.

Outdoor work and exercise improve the general health.

4. Rest.

Rest, relaxation, and sleep are next to food in importance in maintaining health. Loss of sleep lowers the vitality.

5. Health warning.

Much can be done to prevent and control communicable diseases by heeding the warnings of early sickness.

Personal Hygiene.

The following outline divides personal hygiene into (I) the hygienic care of one's person and (II) the care of the area you occupy.

A. Nutrition.

1. Loss of appetite is a warning either of

a. A mental disorder

(1) Emotional state,

(a) Worry, remorse, jealousy, heavy responsibility, or

b. A physical disorder

(1) Eye strain

(2) Improper posture

(3) Improperly fitting shoes.

2. Dietary requirements

a. An adequate diet is composed of the following:

(1) Vitamins

(a) Sufficient vitamins are present in the Army ration.

(2) Green vegetables provide bulk, vitamins, acids, salts, and extractive matters.

(3) Sugar and Starches provide fuel.

(4) Fats and oils in moderate amount are needed.

(5) Minerals, as salt, calcium, magnesium, etc., are present in the ration in sufficient quantities.

(6) Water - necessary for life. Most people drink too little.

b. Constipation

(1) May result from

(a) Insufficient bulk in diet.

(b) Insufficient exercise.

(c) Improper posture and body tone.

(d) Neglect to respond to impulse to move bowels.

c. Rules for Regulation and Control of the Diet.

(1) Keep the mouth clean and healthy to avoid spread therefrom of germs to the alimentary tract. Visit the dentist periodically to avoid the possibility of any dental defect and to insure complete cleanliness.

(2) Correct any body defects that affect nutrition, such as emotional conditions, eye defects, and errors of posture.

(3) Avoid eating immediately before or after heavy exercise or after bathing.

(4) Satisfy dietary requirements as to proteins, fats, carbohydrates, salts, water, and vitamins. Have the calorie (fuel) intake adequate to the needs.

(5) Have enough bulk in the diet and secure a daily bowel movement by hygienic living and regularity in habits.

(6) Be careful of uncooked and unsanitary foods. They may contain disease germs.

(7) Eat food regularly and in moderation, eating it slowly and masticating it thoroughly. Most people eat too much.

(8) Food should be kept from insects and animals; they may carry disease. Mess kits and dishes should be washed in boiling water to cleanse them and to kill any disease germs. Cooks and mess attendants should observe scrupulous cleanliness in all these respects in their person.

(9) Food that seems stale or spoiled should not be eaten.

(10) Do not eat in dirty lunch rooms and restaurants.

(11) An abundance of water should be taken, but too large an amount should not be taken when overheated. An adult should consume at least eight glassfuls of liquid daily. There is little danger of taking too much. Remember that water forms fully two-thirds of the body weight (about ten gallons in an average individual).

(12) Be careful not to drink unclean water which might contain disease germs.

(13) Do not drink cold water rapidly when overheated or

drink anything excessively hot at any time.

(14) Coffee, tea, and cocoa in moderation are not harmful and in many instances prove very beneficial. Intoxicating liquors are harmful.

(15) Drink from your own glass and eat from clean dishes. Do not exchange pipes, cigars, musical instruments played by the mouth, and gas masks with others.

(16) Do not be careless in the disposal of the excretion of the body. These create a nuisance, serve as a breeding place for flies and animals, and may spread disease.

(17) If there is any question about your physical health, any matter about personal hygiene, consult a medical officer who will assist you, and nature, in maintaining the health that is your birthright.

B. Dental Hygiene

1. Brush teeth and rinse mouth twice a day, after meals (to remove food particles).

2. Use rotary movement.

C. Care of the Skin

1. At least 2 baths a week; daily bath preferable.

   a. Special attention to

      (1) Armpits, genitals, crotch, feet.

2. Cleanliness of body helps to prevent disease.

3. Cold baths (below 65° F.) act as a stimulant.

4. Warm baths (90° - 93° F.) are soothing and sedative.

5. Daily shaving

6. Washing the hands is a "must" before eating meals, and after visiting the latrine.

D. Care of the Hair

1. Keep short and combed.

E. Care of the Nails

1. Keep short and clean.

2. Should be cut straight across:

a. Avoid ingrown toe nails.

F. Clothing

1. Wool is valuable because:

a. Being closely woven it can hold air in its meshes; this is a poor conductor of heat and consequently feels warm.

b. Can absorb moisture without feeling wet.

2. Color.

a. Dark clothes absorb heat.

b. White clothes reflect heat.

3. Underclothing should be

a. Washed frequently and well dried.

(1) Damp clothing acts as an excellent soil for germs.

4. Clothing should not restrict the circulation.

5. Raincoats are impermeable to air.

a. Not useful in active occupations and while undergoing exertion.

G. Care of the Feet.

1. Proper fitting shoes and socks are absolutely essential.

2. New shoes.

a. Should not be used on a march.

b. To "Break in":

(1) Stand in about 2½ inches of water for 5 minutes

and then walk about, allowing shoes to dry on the feet.

(2) Waterproofing

(a) Use Neat's foot oil which makes them impermeable to air.

(b) Not to be done, if your feet tend to perspire.

3. Bathing.

a. Dry well between toes to help prevent "athlete's foot."

b. Should be done at the end of a day's march.

c. Softens toe nails.

(1) A good time to cut nails.

4. Blisters.

H. Hygiene of the Respiratory Tract.

1. Best defense of respiratory diseases is a healthy body.

2. Don't pull hairs or secretions from inside of nose. (IMPORTANT).

3. Droplet infection from sneezing, coughing and spitting, spread diseases.

a. Pneumonia.

b. Colds.

c. Influenza.

d. Tuberculosis, and others.

I. Care of the Eyes.

1. Never rub the eyes.

a. There may be germs on the hands.

2. Avoid strains.

a. In reading and close work.

(1) Light should be on level with top of head.

(2) Light should illuminate over the shoulder.

b. Proper reading distance from eye to book.

(1) About 14 inches.

c. Hold book on a level with eyes.

d. Never read in recumbent position, because it

(1) Causes strain on the muscles of downward rotation.

J. Care of the Ears.

1. Never put anything in your ear.

a. Exceptions: "A baseball bat or your elbow."

b. Sharp objects may puncture ear drum.

K. Sleep

1. During sleep nature repairs damages incident to the day's activities.

2. Average person requires 7 - 8 hours out of every 24 to maintain efficiency and preserve vitality.

3. Most benefit from sleep comes under the favorable conditions of

a. Fresh air.

b. Clean bedding.

c. No crowding of sleeping quarters.

L. Physical Exercise.

1. Value

a. Educates the nervous centers which have to do with perception of ideas and with intellectual operations.

2. Posture.

a. Good posture puts the minimum of strain upon the body.

M. Weight and Health.

1. Obese people are more subject to disease.

2. A sudden drop of weight to the extent of 10 lbs. deserves immediate medical investigation.

N. Hygiene of the Genito-Urinary System.

1. Thorough frequent bathing of genitals.

2. Venereal Diseases.

I. Personal equipment.

A. Mess gear.

1. Thorough cleaning in hot water.

B. Clothes.

1. Cleanliness.

2. Care of clothes - keep in repair, keep neat.

3. Proper fitting.

4. Airing and sunning of blankets when there are no laundry facilities.

C. Toilet articles.

1. Good toothbrush, dental floss.

2. Shaving equipment.

3. Handkerchief to cough and sneeze into.

II. The area you occupy.

A. Proper disposal of excreta.

1. Bury feces.

2. Urinate so as not to contaminate

a. Camp site.

b. Stream, ponds, etc.

3. Don't spit

a. In buildings.

b. On pavements.

c. In conveyances.

2. Proper disposal of other wastes.

a. Food particles.

b. Garbage.

c. Refuse.

3. Cleanliness and neatness of

a. Bunk.

b. Clothes.

c. Trunk.

d. Your floor or ground space, whether temporary or permanent.

RESPONSIBILITY FOR MILITARY HYGIENE AND SANITATION

A. The Medical Department is responsible for:

1. Matters affecting the health of the Army.
2. Matters affecting the location of camps.
3. Matters affecting the source and methods of purification of the water supply.
4. Methods and efficiency of waste disposal.
5. Matters affecting the food supply.
6. Mess sanitation.
7. The suitability of clothing and housing of troops.
8. Efficiency of training in personal hygiene and sanitation.
9. The elimination of insects.
10. Performing physical examinations and inspection.
11. The execution of immunization.

B. The Quartermaster Corps is responsible for:

1. The operation of water systems.

2. The operation of sewage disposal systems.

3. The operation of delousing plants.

4. The operation of incinerators and dumps under certain conditions.

5. Certain work connected with the control of mosquito breeding places.

C. The Corps of Engineers is responsible for:

1. The procurement and purification of water.

2. The disposal of wastes under certain conditions.

Finally, you come to the end of this course. You have learned something about hygiene and sanitation. You have been instructed primarily in certain principles. Details have not been particularly stressed, except in those instances where knowledge of certain details might save you unnecessary illness. This book, however, contains a varying number of details - and that is perhaps the greatest value of the book to you. How do you disinfect urine? Of course you don't remember. But you can look it up in the book. By doing so, you are making use of a reference. Facts are always better than guesses.

In summary, 15 worthwhile measures have been listed below for your benefit.

I. Do not drink water which has not been declared potable by a medical officer unless it has been purified by boiling or chlorination. Do not take water from a water sterilizing bag by dipping a cup into the bag or putting your mouth to the faucet.

II. Do not soil the ground with stools or urine. Always use the latrine or the night urine can, provided in the company street.

Pages 158 - 159 missing

and available facilities.

X. Wear clothing of proper weight for the climate. Clothing should fit loosely. Wet clothing, particularly shoes and socks, should be changed as soon as possible.

XI. Keep the hair cut short and the fingernails clean.

XII. Never throw pieces of food or refuse around the camp or in the trench. Such debris attracts flies, and flies carry disease organisms.

XIII. If possible, avoid all contact with diseased persons.

XIV. Avoid venereal diseases. These diseases are almost always contacted by sexual intercourse with an infected woman. If sexual intercourse is had, report as soon as possible (value decreases with every hour's delay) to the hospital or other designated place for "prophylaxis." This prophylactic treatment must be carried out thoroughly and the directions followed exactly if its full protective value is to be obtained.

XV Relax completely during rest periods on a march.

Aerobic — germs which require oxygen for life

Anaerobic — germs which cannot live in the presence or partial presence of oxygen

Case — a person with the germs and symptoms of a communicable disease.

Carrier — a person with the germs, but no symptoms of a communicable disease.

Cleaning — This term signifies the removal by scrubbing and washing as with hot water, soap, and washing soda, of organic matter on which and in which bacteria may find favorable conditions for prolonging life and virulence; also the removal by the same means of bacterial adherence to surfaces.

Communicable disease - a disease caused by the invasion of the tissues of the body by living organisms which can be and are transferred from one human host to another.

Contact — A "contact" is any person or animal known to have been sufficiently near to an infected person or animal to have been presumably exposed to the transfer of infectious material directly or by articles freshly soiled by such material.

Contact- Refers to the spread of disease by means of contact. When a disease is transmitted by contact, the organisms or viruses, remain in the material in which they are discharged from the body.

Examples - germs in sputum, urine, feces.

Direct contact. The infecting organisms are passed directly, without the intervention of any object or substance and usually by inoculation, from the tissues of the infected person to the tissues of the susceptible individual. Sexual intercourse spreads venereal diseases, if the source is infected. Kissing spreads or transmits measles, mumps, smallpox, and many other respiratory diseases.

Indirect contact. The infecting organisms are passed indirectly as by cigarettes, drinking cups, towels, etc., from a source to the tissues of a susceptible.

Delousing - Delousing refers to the process by which a person and his personal apparel are treated so that neither the adults nor the eggs of the varieties of lice that infest man, survive.

Discharges Includes excreta and any abnormal matter (as pus) eliminated from the body.

Disease- In general, any departure from a state of health; an illness, or sickness.

Disinfection.-- The destruction or great weakening of the infectious agent by physical or chemical means.

Disinfesting - By disinfesting is meant any process, such as the use of dry or moist heat, gaseous agents, poisoned food, trapping, etc., by which insects and animals known to be capable of conveying or transmitting infection may be destroyed.

Epidemics —— or outbreaks of disease will develop when there is present a highly virulent micro-organism and a sufficient number of persons who are susceptible to that particular micro-organism. The spread of the disease is influenced by whether or not susceptibles come in contact with the infective organisms. The best means to prevent this, and hense, control the spread of epidemics is to detect new cases as early as possible, and isolate them.

Excreta - Respiratory secretions, feces, urine, vomitus, sweat.

Fermentation Decomposition due to the influence of a ferment. For example, a weak alcoholic solution may change into vinegar as a result of fermentation.

Filtrable virus The term "filtrable virus" as defining the etiological agent of certain diseases is used in the sense of a casual agent differentiated from other kinds of infectious agents such as bacteria, protozoa, etc. Many of these filtrable viruses can be grown *in vitro* in the presence of living susceptible cells, and such cultures will produce, regularly, typical diseases in animals and in man. The term "filtrable virus" has a significance comparable to that of bacterium, spirochaeta or protozoon and is as definite a description of an etiological agent as is the statement that the typhoid bacillus causes typhoid fever. The idea conveyed by the statement that a filtrable virus is etiological agent is that the cause of this disease is

known, even though present knowledge does not permit further precision in distinguishing among filtrable viruses except by reference to the name of the disease produced by each.

Fumigation - Fumigation means a process by which the destruction of insects, as mosquitoes and body lice, and of animals, as rats, is accomplished by the use of gaseous agents.

Host — Any animal or plant upon which another organism lives parasitically. The rat is the host of the rat flea.

Incubation Period The period between the time a person is first infected with a communicable disease until the first clinical symptoms appear is known as the incubation period.

Infection. The invasion of the tissues of the body by pathodgenic orgainsms, resulting in injury and followed by certain reactions (heat, pain etc.)

Infectious liable to be communicable by infection. An infectious disease is one caused by parasites, such as bacteria, protozoa, or fungi; it may or may not be infectious.

Infestation An invasion by animal parasites.

Ingestion The act of taking food, medicines, etc., into the body.

Metamorphosis Change of shape or structure, particularly a change from one stage of development to another stage, as insects.

Non effective rate ----- Refers to the number of men sick per daily in the hospital or quarters per 1000 strength. Its purpose is to determine the number of troops in a given command that are physically fit for duty on a given day, or the average non-effectiveness caused by a disease during a selected period of time.

Example:

Size of command 500
Number sick in hospital
or quarters.....12

Therefore,

the non-effective rate per
1000.....24

Phagocytosis-- is the ability of the white blood cells of the body, particularly the polymorphonuclear leucocytes ("polys"), to engulf and destroy the invading micro-organisms.

In some diseases the polymorphonuclear leucocytes are unable to overcome the infection and death results.

In a way the polys are like a small powerful regular army, able to resist and often defeat certain types of enemies (bacteria).

Potable Fit to drink.

Putrefaction the decomposition (decay) of animal or vegetable matters.

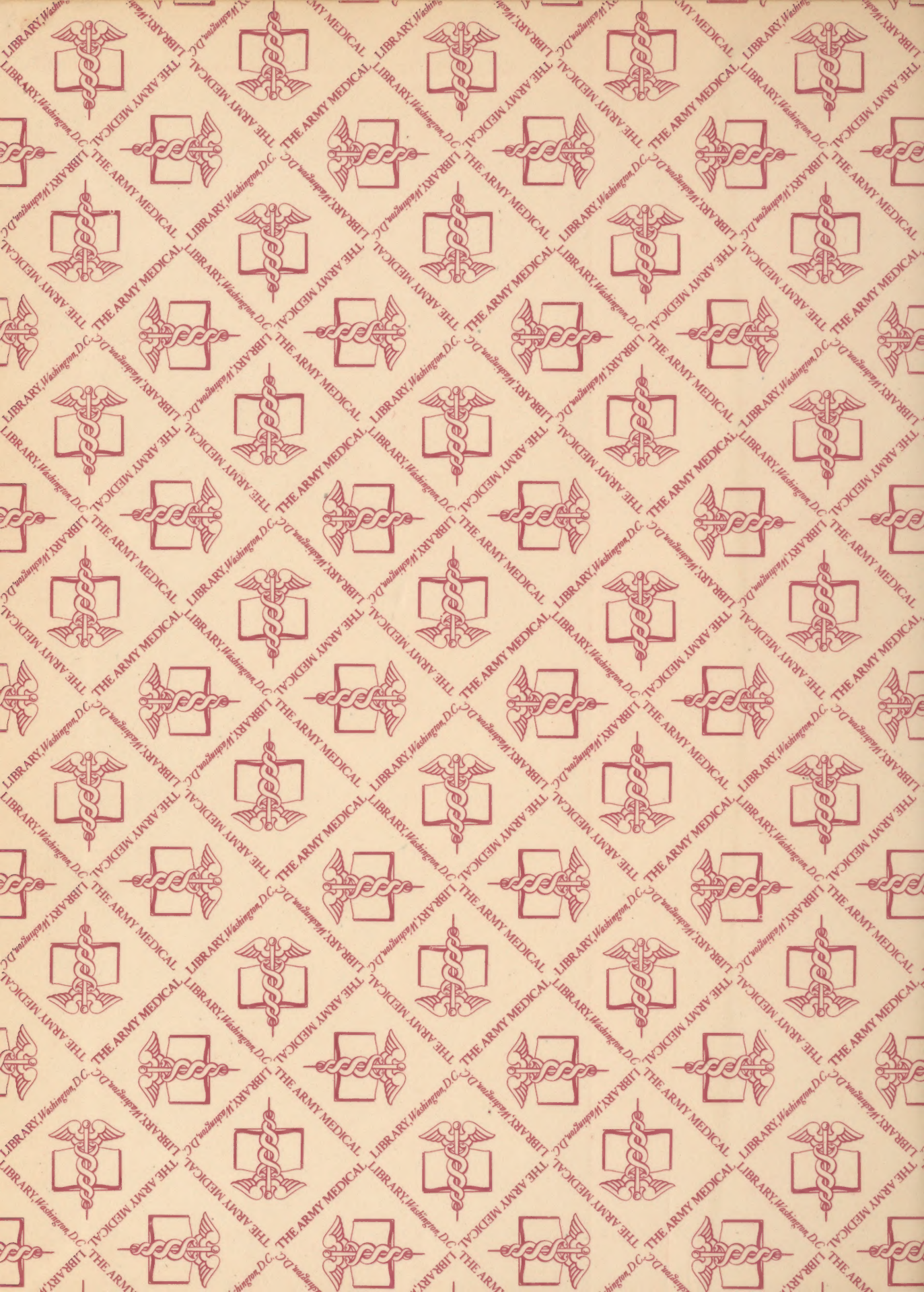
Sources of Infection This term refers to those humans and animals that are storehouses or supply bases for pathogenic organisms.

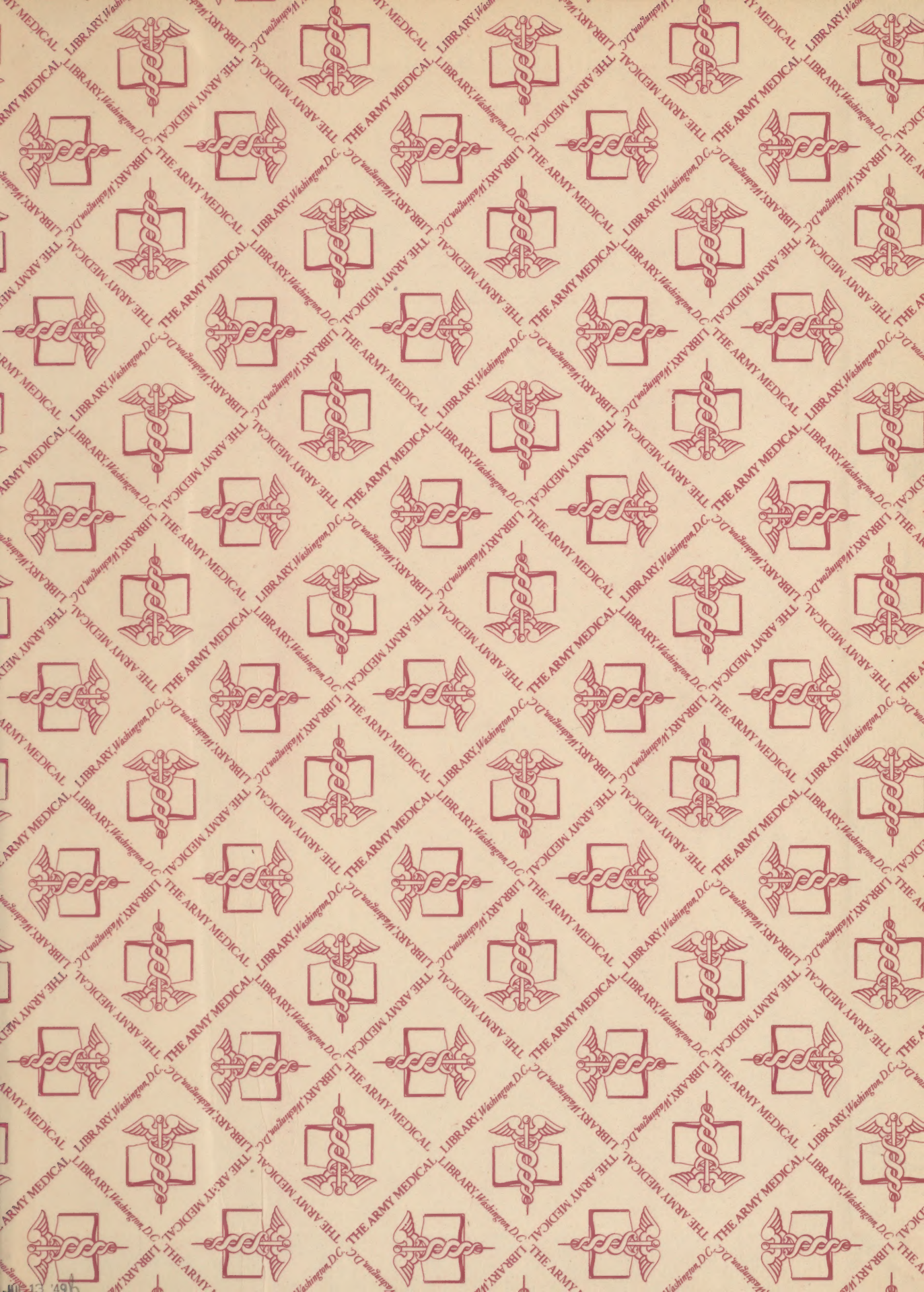
Susceptibles persons who may or can catch a communicable disease if certain "conditions are right" ---for example lack of vacination, presence of very virulent germs, lowered resistance of the susceptible, etc.

Symptom Any evidence of disease; Example---fever, chill, skin rash.

Transmitting Agent This term refers to those agents that transmit (carry) pathogenic organisms from one place to another. Examples are: air, food, water, insects.

Virulence--- The ability of pathogenic bacteria to produce disease is known as virulence. This virulence is increased by suitable food, moisture, temperature, such as found in the human body.


THE ARMY MEDICAL LIBRARY, Washington, D.C.


THE ARMY MEDICAL LIBRARY, Washington, D.C.